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EQUIPMENT AND UNIT CLASSIFICATIONS, SPECIAL ABBREVIATIONS, SPECIAL SYMBOLS AND CROSS REFERENCE GUIDE FOR INTEGRATED CIRCUITS

ALSO COVERS:

82061A, 90955A, 90956A,

95336D, 90957A

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EQUIPMENT AND UNIT CLASSIFICATIONS, SPECIAL ABBREVIATIONS, SPECIAL SYMBOLS AND CROSS REFERENCE GUIDE FOR INTEGRATED CIRCUITS

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1. GENERAL

1.01 As an aid to easier comprehension, the equipment and unit classifications, special abbreviations and special symbols used in this manual are described herein. Also described is the cross reference guide of integrated circuits (ICs), indicating equivalent ICs manufactured by Nippon Electric Co., and other manufacturers.

1.02 This section is being reissued as issue 2 to add the IC cross reference guide.

2. EQUIPMENT AND UNIT CLASSIFICATIONS

2.01 Equipment and units (or modules) for various system applications are classified by suffixes proceded by equipment type numbers and unit (or module) type numbers. Where equipment and units (or modules) are described commonly, the symbols ( ), [ ] and ⌜ ⌟ are used as suffixes.

Example:

Equipment; MDP-45MB-( ) Modulator-Demodulator for MDP-45MB-3A, 3B, 4A, 4B, 5A and 5B Modulator-Demodulator.

Unit; 54184( ) B-U CONV for 54184A, B, C and D B-U CONV.

3. SPECIAL ABBREVIATIONS

3.01 Abbreviated names of units (or modules), controls and indicators used in this manual agree with those stamped on each unit (or module) and the equipment bay. Special abbreviations used in this manual are listed in Table A.

4. SPECIAL SYMBOLS

4.01 Special symbols used in this manual are listed in Table B.

5. CROSS REFERENCE GUIDE FOR INTEGRATED CIRCUITS

5.01 Tables C through E list the ICs used in the electronic circuits of radio equipment and indicate the types of ICs equivalent to the ICs manufactured by Nippon Electric Co., and other manufacturers.

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TABLE A

SPECIAL ABBREVIATIONS

ABBREVIATION	WORD	ABBREVIATION	WORD
AGC V	AGC bias voltage	PARA SEND	Parallel sending
AGC V MON	AGC bias voltage monitor	PIL	Pilot
ANODE VOLT ADJ	Anode voltage adjuster	PLD	Phase-locked discriminator
ANS INTERFACE	Answer interface	PLL	Phase-locked loop
BER	Bit error rate	PLS	Pulse
		PN STATE	Pseudo-noise state
CAR, CARR	Carrier	PROT	Protection
CBL	Cable	PSK	Phase-shift keying
CH	Channel	QAM	Quadrature amplitude modurator
CL, CLK	Clock		
CL MON	Clock monitor	REG	Regular
CML	Current-mode logic	R MIX	Receiver mixer
D/I	Drop and insertion	RMT CONT	Remote control
DPC	Digital Processor/Combiner	RSW	Receiver switch
DPS	Digital Processor/Switchover	RX	Receiver, Receiving
DPSK	Differential phase-shift keying	RX SYNC ALM	Receiver synchronizing alarm
D SC	Digitized service channel	RZ	Return to zero
ERR MON	Error monitor	SC, SV	Service channel
		S FRAME	Super frame
G, GND	Ground	SQL	Squelch
HS	Hot standby	SW RESP	Switching response
IF LEV	IF level	T PWR	Transmitter output power
INC	Increase	TSW	Transmitter switch
		TTL	Transistor-transistor logic
LED	Light-emitting diode	TX	Transmitter, Transmitting
MODEM	Modulator Demodulator	VCO	Voltage-controlled oscillator
MPX	Multiplexer	VSWR	Voltage standing-wave ratio
No. 1 PS	No. 1 power supply	#	Number
NRZ	Nonreturn to zero		

TABLE B

SPECIAL SYMBOLS

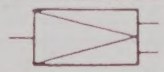
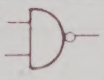
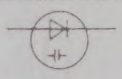
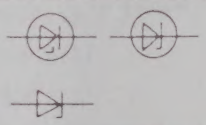
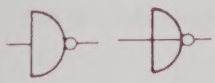
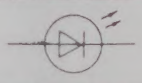
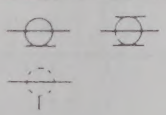
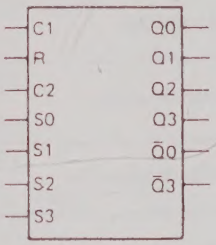
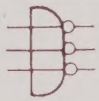
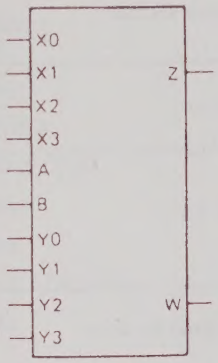
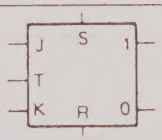
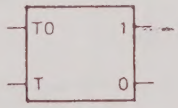
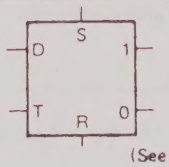
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	Fixed capacitor		Amplifier
	Variable capacitor		Amplifier providing two outputs
	Electrolytic capacitor		AND
	Feedthrough capacitor		OR
	Diode or rectifier		NAND
	Varactor		NOR
	Zener diode		NOT
	Light-emitting diode		Exclusive OR
	Toggle switch		OR type propagation time adjuster
	Toggle switch type circuit breaker		Exclusive OR type propagation time adjuster
	Coaxial shield connection		

TABLE B (Cont)

SPECIAL SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	Exclusive NOR type propagation time adjuster	 (See note)	Binary counter
	No input OR/NOR		
	Exclusive OR/NOR		
	3-input 3-output NOR	 (See note)	4 to 1 Multiplexer
 (See note)	J-K Master-slave Flip-Flop		
	T Flip-Flop		
 (See note)	D Master-slave Flip-Flop		

Note: In the block and schematic diagrams, only the terminal used is indicated.

TABLE C

10K SERIES (ECL)

NIPPON ELECTRIC	MOTOROLA	FAIRCHILD	SIGNETICS	TEXAS INSTRUMENTS	HITACHI
μPB10100	MC10100	10100	10100		
μPB10101	MC10101	10101	10101	SN10101	HD10101
μPB10102	MC10102	10102	10102	SN10102	HD10102
μPB10103	MC10103	10103	10103	SN10103	
μPB10105	MC10105	10105	10105	SN10105	HD10105
μPB10106	MC10106	10106	10106	SN10106	HD10106
μPB10107	MC10107	10107	10107	SN10107	HD10107
μPB10109	MC10109	10109	10109	SN10109	HD10109
μPB10110	MC10110	10110	10110	SN10110	HD10110
μPB10111	MC10111	10111	10111	SN10111	
μPB10115	MC10115	10115	10115	SN10115	
μPB10117	MC10117	10117	10117	SN10117	
μPB10118	MC10118	10118	10118	SN10118	
μPB10123	MC10123	10123	10123		
μPB10124	MC10124	10124	10124		
μPB10125	MC10125	10125	10125		
μPB10131	MC10131	10131	10131	SN10131	HD10131
μPB10133	MC10133	10133	10133	SN10133	
μPB10135	MC10135	10135	10135		
μPB10136	MC10136	10136	10136		
	MC10138	10138	10138		
μPB10158	MC10158	10158	10158	SN10158	
μPB10160	MC10160	10160	10160	SN10160	
μPB10161	MC10161	10161	10161	SN10161	
μPB10262	MC10162	10162	10162	SN10162	
μPB10164	MC10164	10164	10164	SN10164	HD10164
μPB10170	MC10170	10170	10170		
μPB10174	MC10174	10174	10174	SN10174	HD10174
μPB10176	MC10176	10176	10176	SN10176	
μPB10180	MC10180	10180	10180	SN10180	HD10180
μPB10181	MC10181	10181	10181	SN10181	HD10181
μPB10210	MC10210	10210		SN10210	

TABLE D

74LS SERIES (LS TTL)

NIPPON ELECTRIC	FAIRCHILD	TEXAS INSTRUMENTS
μPB74L S00	74L S00	SN74L S00
μPB74L S02	74L S02	SN74L S02
μPB74L S03	74L S03	SN74L S03
μPB74L S04	74L S04	SN74L S04
μPB74L S05	74L S05	SN74L S05
μPB74L S08	74L S08	SN74L S08
μPB74L S10	74L S10	SN74L S10
μPB74L S11	74L S11	SN74L S11
μPB74L S20	74L S20	SN74L S20
μPB74L S21	74L S21	SN74L S21
μPB74L S27	74L S27	SN74L S27
μPB74L S30	74L S30	SN74L S30
μPB74L S32	74L S32	SN74L S32
μPB74L S86	74L S86	SN74L S86

TABLE E

200/2000 AND 74 SERIES (TTL)

NIPPON ELECTRIC		FAIRCHILD	TEXAS INSTRUMENTS
200/2000 SERIES	74 SERIES		
μPB201	μPB7400	SN7400	7400
μPB202	μPB7410	SN7410	7410
μPB203	μPB7420	SN7420	7420
μPB204	μPB7430	SN7430	7430
μPB205	μPB7440	SN7440	7440
μPB206	μPB7450	SN7450	7450
μPB207	μPB7451	SN7451	7451
μPB208	μPB7453	SN7453	7453
μPB209	μPB7454	SN7454	7454
μPB210	μPB7460	SN7460	7460
μPB211			
μPB212			
μPB213			
μPB214	μPB7474	SN7474	7474
μPB215			
μPB2086	μPB7486	SN7486	7486
μPB2123	μPB74123	SN74123	74123

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2 GHz/6 GHz/7 GHz/11 GHz SHIFTER

90955A 2 GHz SHIFTER
90956A 6 GHz SHIFTER
95336D 7 GHz SHIFTER
90957A 11 GHz SHIFTER

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2. PERFORMANCE WO-I-1
3. PRINCIPLES OF OPERATION WO-I-1
4. MAINTENANCE WO-I-6
Chart 1 - Test Connection WO-I-6
Chart 2 - X'TAL OSC Unit Replacement .. WO-I-8
5. REFERENCE DRAWINGS WO-I-9

1. GENERAL

1.01 This section describes the 90955A 2 GHz, 90956A 6 GHz, 95336D 7 GHz and 90957A 11 GHz Shifters used for loop-testing the Transmitter Receiver.

1.02 To add information on the 95336D 7 GHz SHIFTER, this section has been completely revised as Issue 2.

2. PERFORMANCE

2.01 Following are the performance characteristics of each shifter.

Performance	2 GHz Shifter	6 GHz Shifter	7 GHz Shifter	11 GHz Shifter
Frequency Range	1.7 to 2.3 GHz	5.9 to 6.4 GHz	7.1 to 7.7 GHz	10.7 to 11.7 GHz
Input Level	Max. +25 dBm (0 dBm, nominal)	Max. +25 dBm (0 dBm, nominal)	Max. +27 dBm (0 dBm, nominal)	Max. +25 dBm (0 dBm, nominal)
Output Level Range	*-30 to -90 dBm	*-40 to -90 dBm	*-40 to -90 dBm	*-40 to -90 dBm
Shift Frequency	Depends on type of X'TAL OSC unit			
Frequency Stability	Within $\pm 2 \times 10^{-5}$			
Type of Connector	HRM(f) (NEC)			
Power Requirement	115 VAC (or 240 VAC), 100 mA			

* These values apply to input level of 0 dBm. When input level is not 0 dBm, output level range deviates corresponding to input level deviation from 0 dBm, but its variable range remains constant.

3. PRINCIPLES OF OPERATION

3.01 The Shifter consists of a SHIFT CCT section and SHIFT OSCILLATOR section. For the operating levels (typical values) of the principal components, refer to the block and level diagram in Fig. 2.

3.02 In the SHIFT CCT section, a signal with frequency Ft is fed to the RF IN jack from the transmitter to be tested. Here, the signal is passed through the coaxial cable CBL1 and applied to the coaxial attenuator ATT1 (reduces signal level by 20 dB). Then, the signal is mixed with another one received from the SHIFT OSCILLATOR section (generates a shift frequency Fs) at the SHIFT MIX and accordingly, two frequencies (Ft + Fs and Ft - Fs) appear at the output. The signals thus obtained are level-adjusted at the variable attenuators (consists of ATT2 and ATT3 for 2 GHz Shifter or ATT2, ATT3 and ATT4 for 6 GHz/7 GHz/11 GHz Shifter and fed through coaxial cable CBL2 to the RF OUT jack (connected to the receiver to be tested). The bandpass filter of the receiver extracts only the frequency identical with the receive frequency of the two frequencies.

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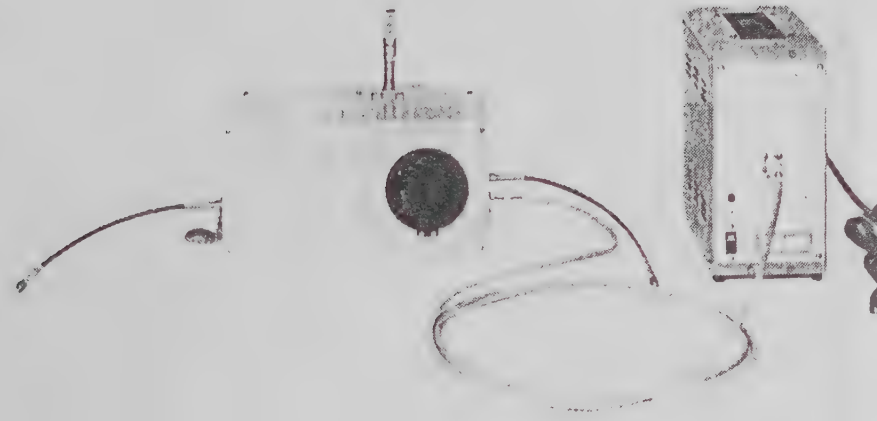
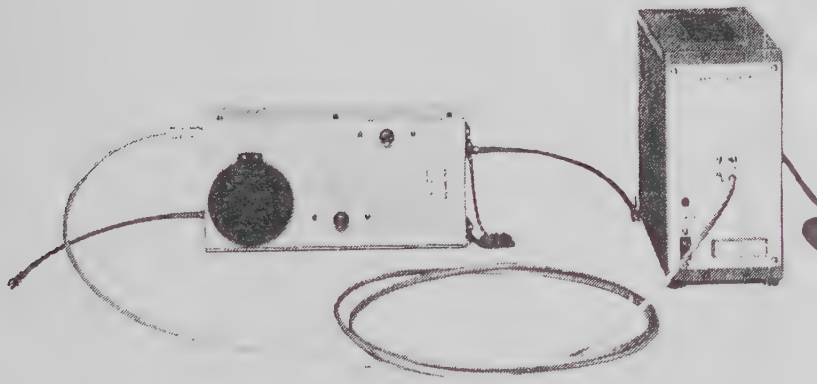
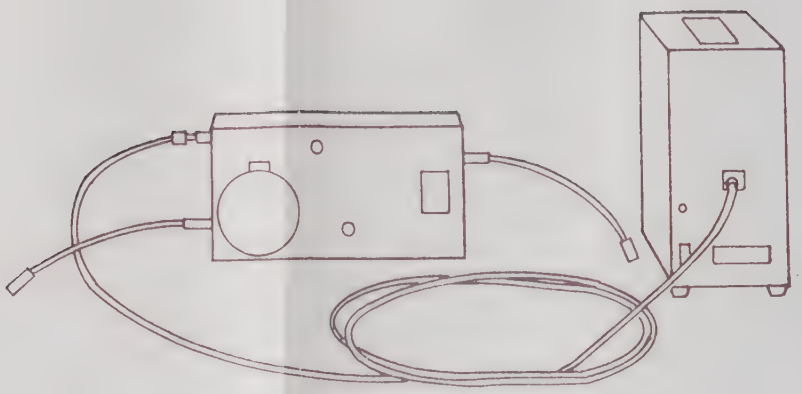


(a) 2 GHz SHIFTER



(b) 6 GHz SHIFTER

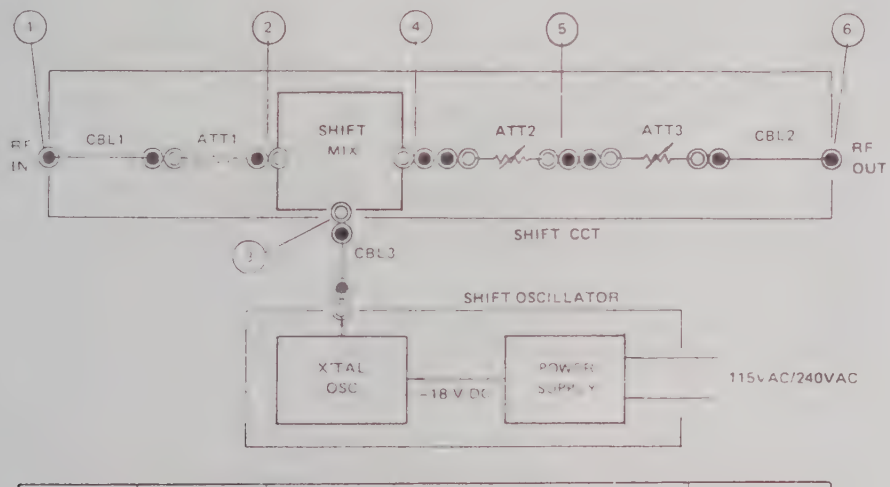


(c) 7 GHz SHIFTER

(d) 11 GHz SHIFTER

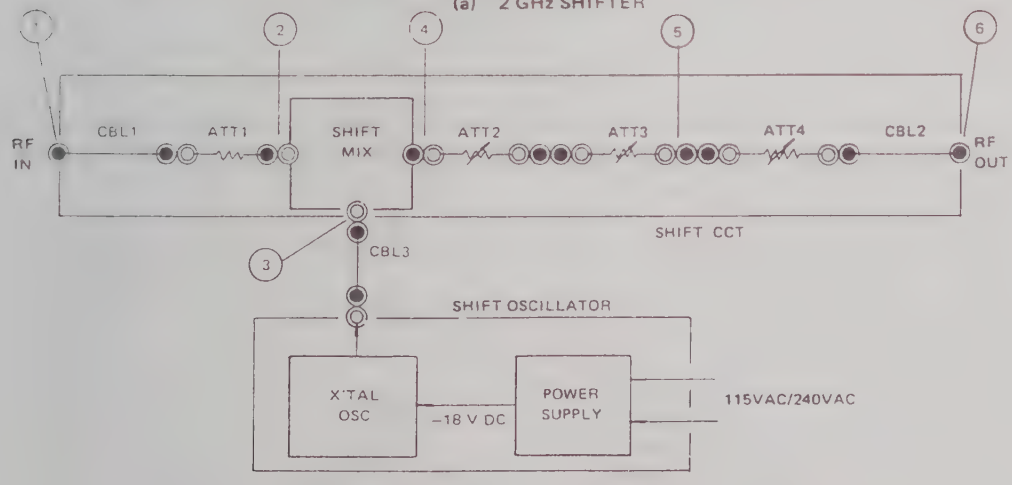
Fig. 1—2 GHz/6 GHz/7 GHz/11 GHz Shifter

3.03 The SHIFT OSCILLATOR section includes a X'TAL OSC unit and Power Supply circuit. The Power Supply circuit produces a regulated -18 V DC from an input of 115 V AC (or 240 V AC) and supplies it to the X'TAL OSC unit. The X'TAL OSC unit (consists of a crystal-controlled oscillator with a fundamental frequency amplifier and multiplier) provides a generated signal of shift frequency at +10 dBm through coaxial cable CBL3 to the SHIFT CCT section. The shift frequency is the difference between the transmit and receive frequencies of the transmitter and receiver to be tested. Various X'TAL OSC units are available for coping with the demands for shift frequency.



1	2	3	4	5	6
0 dBm	-20 dBm	+10 dBm	-30 dBm	30 to -80 dBm	-30 to -90 dBm

(a) 2 GHz SHIFTER



1	2	3	4	5	6
0 dBm	-20 dBm	+10 dBm	-35 dBm	-40 to -80 dBm	-40 to -90 dBm

(b) 6 GHz/7 GHz/11 GHz SHIFTER

Fig. 2—Block and Level Diagram

4. MAINTENANCE

4.01 This section describes the procedures for test connection of the shifter and replacement of the X'TAL OSC unit.

4.02 The method of connecting the shifter and the procedure for level calibration of the received field strength needed in the measurement, using a variable attenuator are given in Chart 1.

4.03 To change shift frequency of shifter, replace X'TAL OSC unit with one of desired shift frequency (see Chart 2).

CHART 1

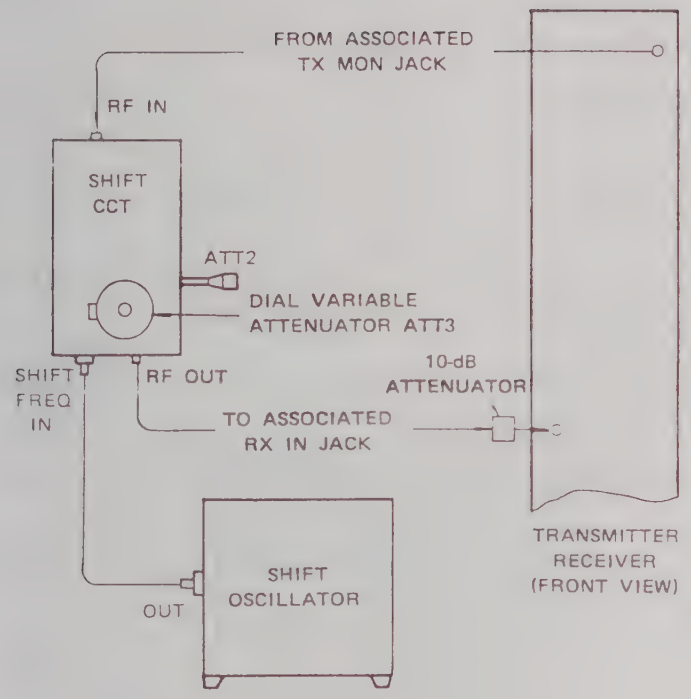
TEST CONNECTION

Warning: To avoid damaging resistor inside variable attenuator, handle unit with extreme care.

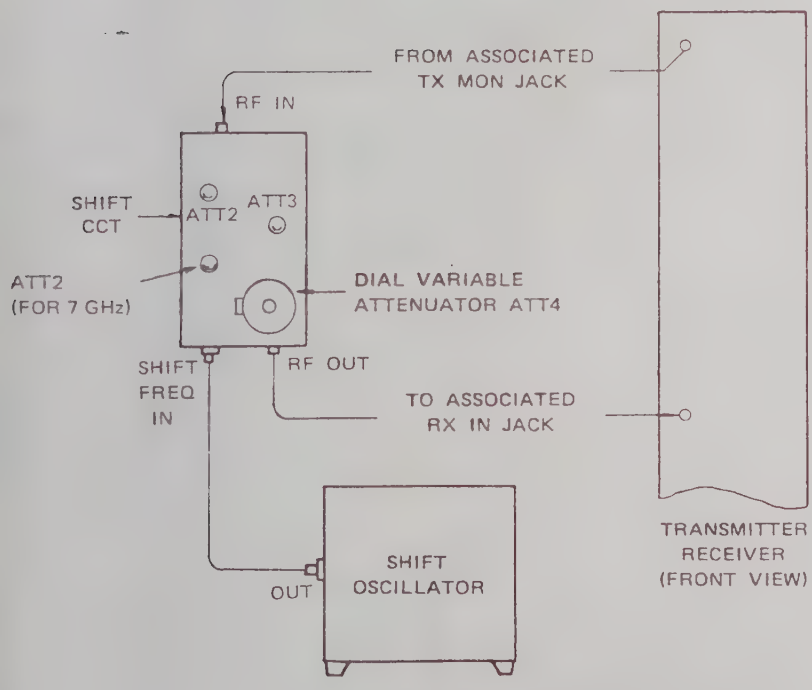
APPARATUS:

Not required

STEP	PROCEDURE
1	Connect RF IN jack to TX MON jack of transmitter to be tested and RF OUT jack to RX IN jack of receiver to be tested (through 10-dB attenuator if necessary) (see Fig. 3)
2	Connect power cord to 115 V AC (or 240 V AC) outlet
3	Set variable attenuator ATT3 (for 2 GHz Shifter) or ATT4 (for 6 GHz/7 GHz/11 GHz Shifter) dial to zero
4	Turn on power switch
5	Apply unmodulated signal from transmitter side. Using check-meter and AGC calibration curve obtained, adjust variable attenuators ATT2 (for 2 GHz Shifter) or ATT2 and ATT3 (for 6 GHz/7 GHz/11 GHz Shifter) until receiving signal level of A dBm appears. *Note:* A is a field strength which is very close to the received field strength required for measurement.
6	Adjust variable attenuator ATT3 (for 2 GHz Shifter) or ATT4 (for 6 GHz/7 GHz/11 GHz Shifter) to obtain required level as given below: Receiving signal level = A – B (dBm) Where, B is the set value (dB) of ATT3 or ATT4. *Note:* Attenuation of ATT3 or ATT4 appears on dial scale of ATT3 or ATT4 and its variable range is 10 dB. If measuring range of receiving signal level exceeds 10 dB, readjust ATT2 and ATT3 as in Step 5.



(a) 2 GHz/SHIFTER



(b) 6 GHz/7 GHz/11 GHz SHIFTER

Fig. 3—Test Connection

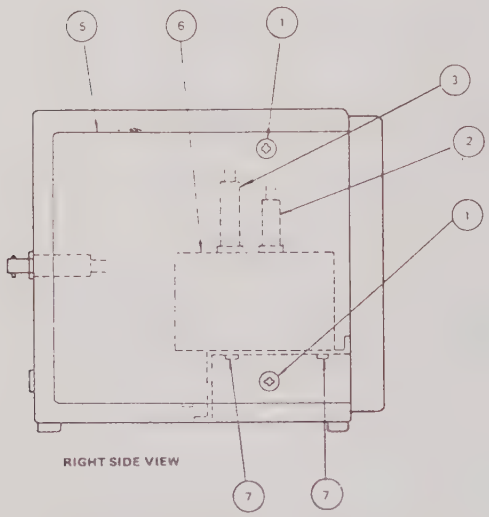
CHART 2

X'TAL OSC UNIT REPLACEMENT

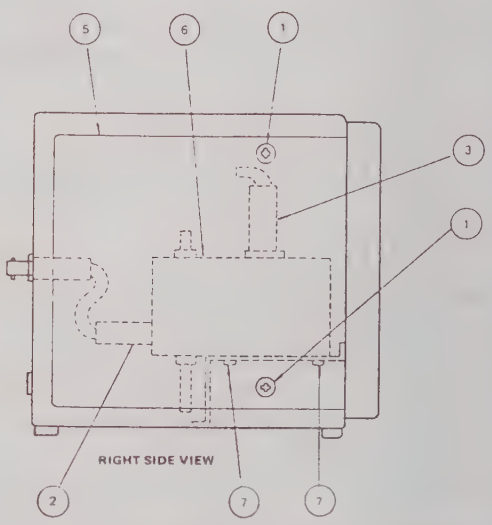
APPARATUS:

Not required

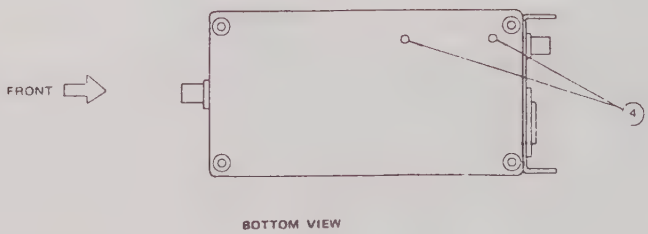
STEP	PROCEDURE
1	Release two screws (1) and remove cover (5) from SHIFT OSCILLATOR
2	Remove BNC plug (2) (for output terminal) and multipin plug (3) (for power supply terminal) from X'TAL OSC unit (6)
3	Remove two screws (7) (fixing X'TAL OSC unit (6)) by inserting driver into hole (4) at bottom of SHIFT OSCILLATOR
4	Remove X'TAL OSC unit from SHIFT OSCILLATOR and mount new X'TAL OSC unit into SHIFT OSCILLATOR, reversely to above process.



FOR SHIFT FREQUENCY OF 470 MHz OR LESS



FOR SHIFT FREQUENCY OF MORE THAN 470 MHz



5. REFERENCE DRAWINGS

	DRAWING NUMBER
90955A 2 GHz Shifter	
Outline drawing:	181-390955-X
Parts lists:	181-290955-X 181-290960-X
Schematic Diagram:	181-190955-X 181-190960-X
90956A 6 GHz Shifter	
Outline drawing:	181-390956-X
Parts lists:	181-290956-X 181-290961-X
Schematic Diagram:	181-190956-X 181-190961-X

	DRAWING NUMBER
95336D 7GHz Shifter	
Outline drawing:	181-395336-X
Parts lists:	181-295336-X 181-295337-X
Schematec Diagram:	181-195336-X 181-195337-X
90957A 11 GHz Shifter	
Outline drawing:	181-390957-X
Parts lists:	181-290957-X 181-290962-X
Schematic diagram:	181-190957-X 181-190962-X

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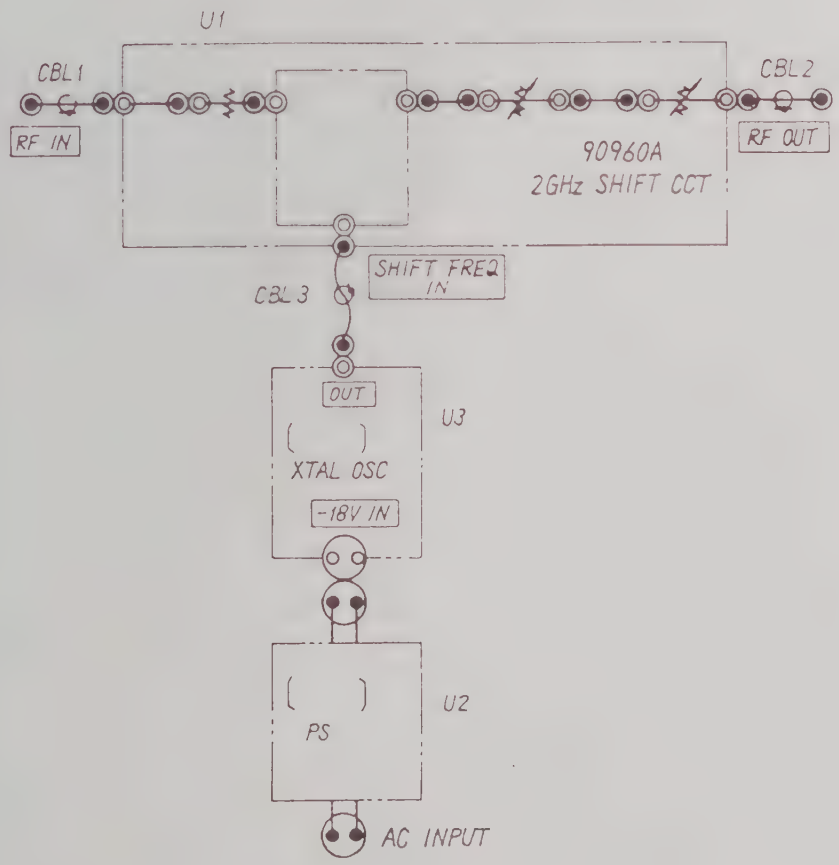

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LIMIT	SCALE	/	90955A 2GHz SHIFTER SCHEMATIC DIAGRAM
	ENG.	H. Konishi	
REF. No.	CHKD.		
	APP.	T. Hayazaki	181-190955-X

79.11.15

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
CBL1	182-353264-A020	CABLE ASSY	1	
CBL2	182-353264-A020	CABLE ASSY	1	
CBL3	182-353277-A010	CABLE ASSY	1	
U1	MPD-090960-A000	2GHZ SHIFT CCT (90960A)	1	
U2	RKS-E75540-0001	DC POWER SUPPLY (7554E1)	1	
U3	RKS-E75550-0001	CRYSTAL OSCILLATOR (7555E1)	1	28-160MHz

ENG. H. Konishi コニシ ヒロシ	ISSUE	90955A
APPD. Kazuo Omoto		2GHZ SHIFTER
		PARTS LIST 181-290955-X

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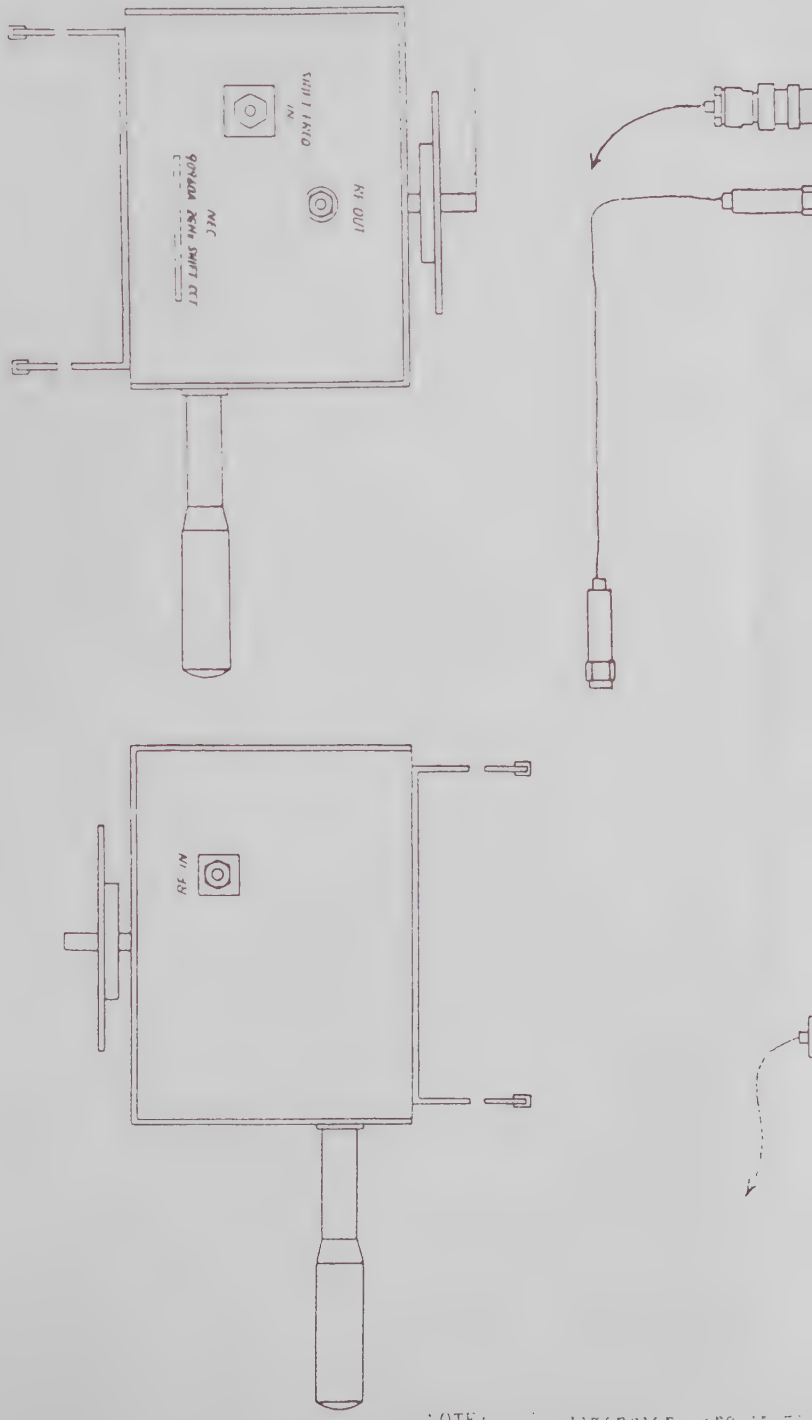
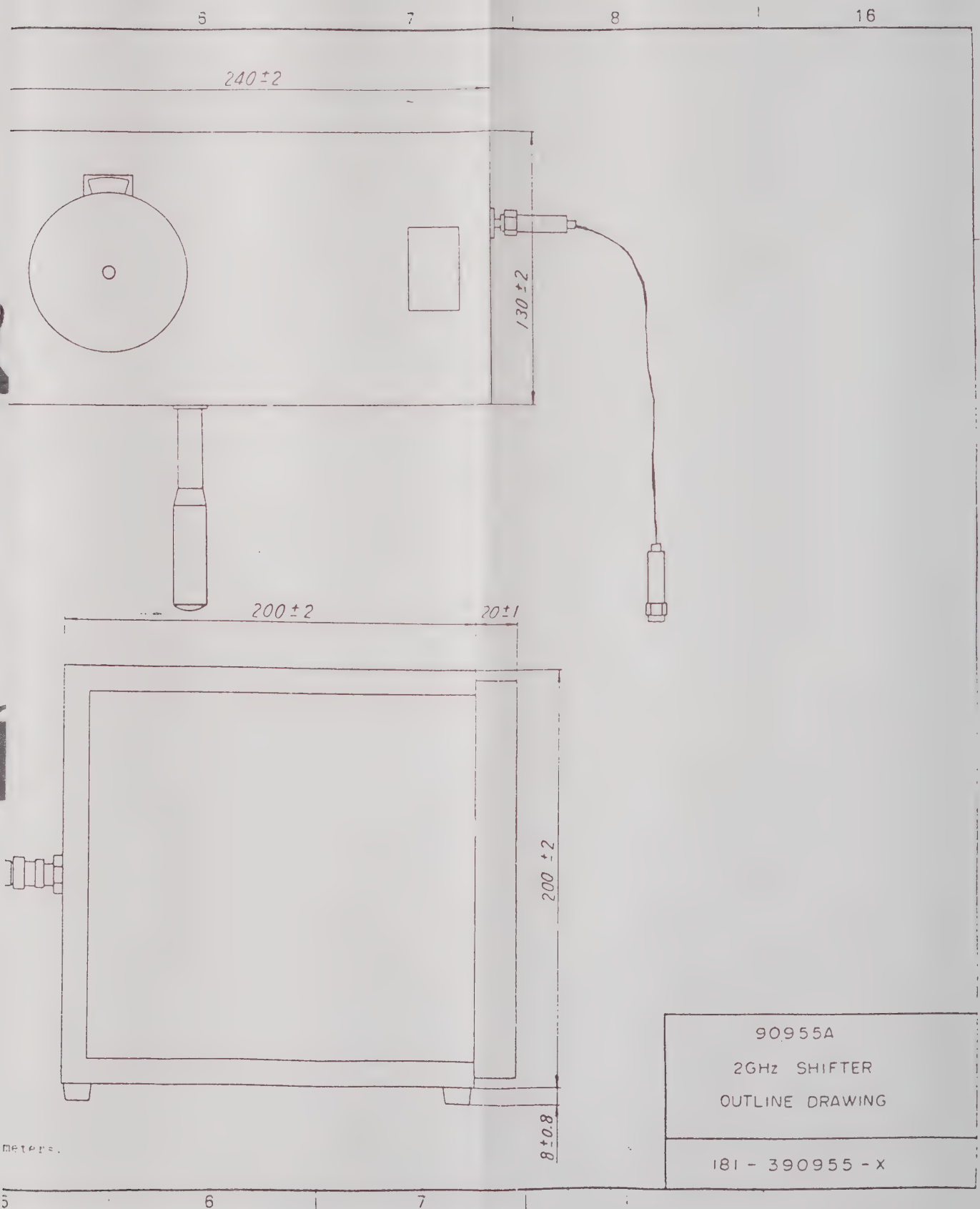
AP ROLL
LIMIT
REF. No.

SCALE:
ENG.: A. Hara, T. Kawada, K. Isogai
CHKD.:
APP.:



NOTE: 1. Dimensions are in mm.



90955A

2GHz SHIFTER

OUTLINE DRAWING

181 - 390955 - X

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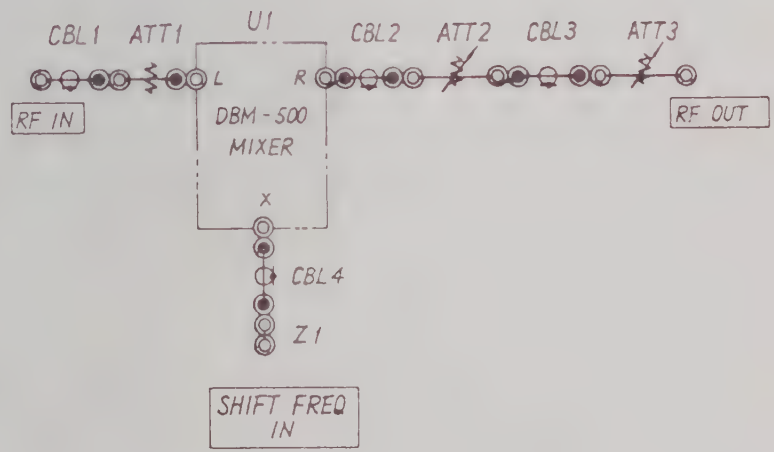

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FILM			
AP ROLL			
LIMIT	SCALE	/	90960A 2GHz SHIFT CCT SCHEMATIC DIAGRAM
	ENG.	H. Konishi	
REF. No.	CHKD.		181-190960-X
	APP.	T. Kyozuka	

79.11.19

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
ATT1	RKS-Z10150-5220	COAXIAL,ATTENUATOR,FIXED 50-OHM 20DB SMA-SMA (1015Z52 20DB)	1	
ATT2	MKZ-206253-0000	COAXIAL,ATTENUATOR,VARIABLE (3-4414-50A)	1	
ATT3	MKZ-206254-0000	COAXIAL,ATTENUATOR,VARIABLE (4617-10M)	1	
CBL1	182-353263-A010	CABLE ASSY	1	
CBL2	182-353264-A010	CABLE ASSY	1	
CBL3	182-353265-A010	CABLE ASSY	1	
CBL4	142-390686-0050	CABLE ASSY	1	
U1	MKZ-206255-0000	MIXER (DBM-500)	1	
Z1	RKS-J10170-0601	CONNECTOR,COAXIAL 50-OHM BNC-BNC (3C-PA)	1	

ENG.	ISSUE	90960A	
APPD.		2GHZ SHIFT CCT	
		PARTS LIST	181-290960-X

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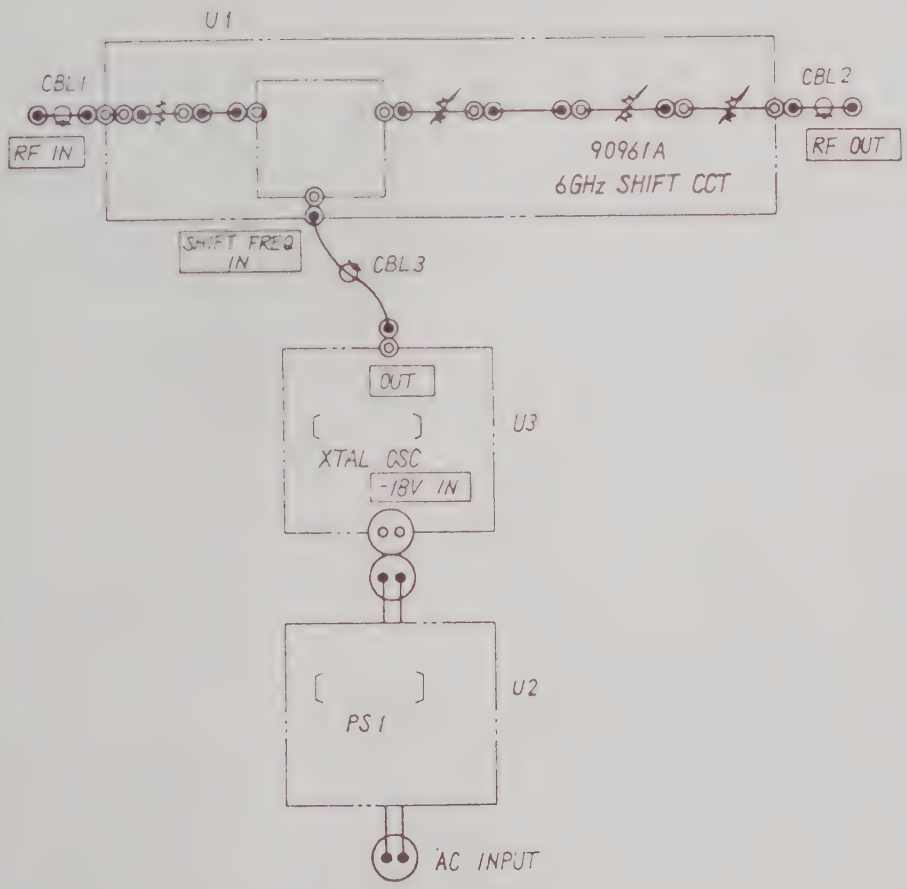

FILM			
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LIMIT	SCALE	/	90956A 6GHz SHIFTER SCHEMATIC DIAGRAM
	ENG.	K. Konishi	
REF. No.	CHKD.		181-190956-X
	APP.	Tokuzaki	

79.11.15

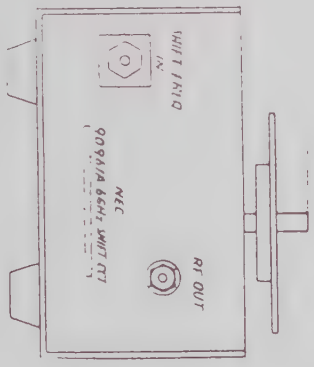
SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
CBL1	182-353264-A020	CABLE ASSY	1	
CBL3	182-353277-A010	CABLE ASSY	1	
CLB2	182-353264-A020	CABLE ASSY	1	
U1	MPO-090961-A000	6GHZ SHIFT CCT (90961A)	1	
U2	RKS-E75540-0001	DC POWER SUPPLY (7554E1)	1	
U3	MPO-082061-A000	XTAL OSC (82061A)	1	250-300MHZ

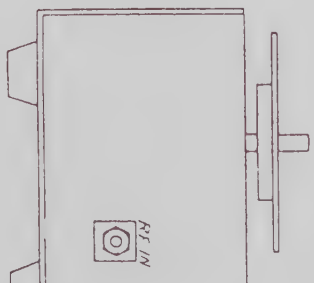
ENG. H. Konishi コニシ ヒロシ	ISSUE	90956A
APPD.		6GHZ SHIFTER
		PARTS LIST 181-290956-X

1 2 3 4 5

DESCRIPTION

10±0.8 70±1.6 21.9±1





NOTE: All dimensions are in millimeters.

SCALE
ENG. A. Kara
CHKD. A. Usano
APP.

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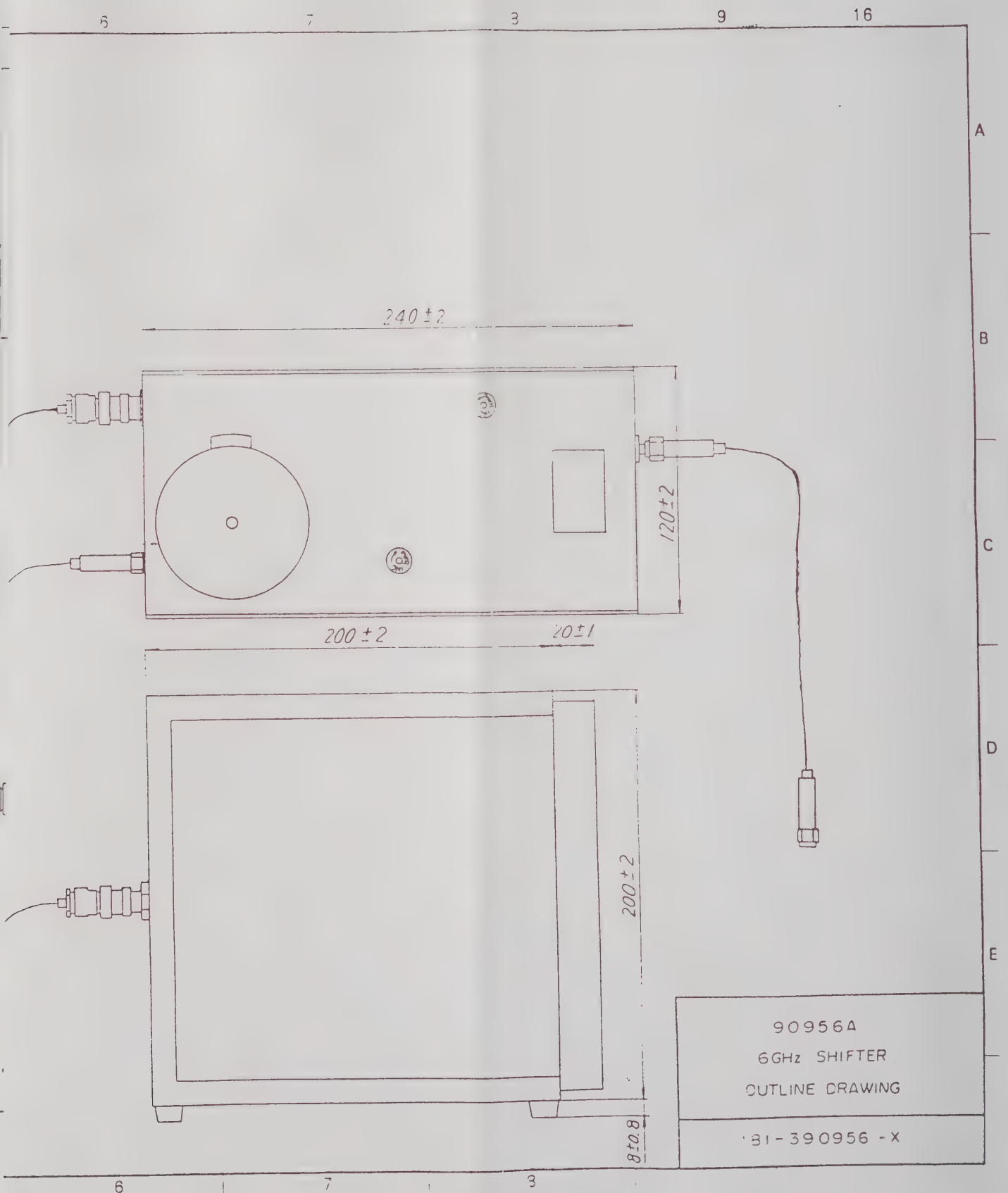
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200±2
20±1
200±2
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90956A
6GHz SHIFTER
OUTLINE DRAWING
81-390956-X

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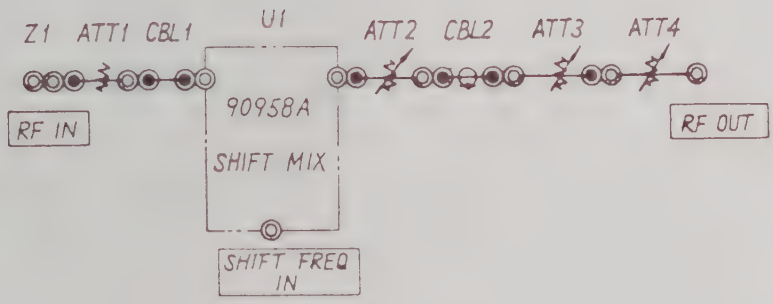

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m

FILM		
AP ROLL		
LIMIT	SCALE	/
	ENG.	H. Konishi
REF. No.	CHKD.	
	APP.	T. Kyuzaki

90961A
6GHz SHIFT CCT
SCHEMATIC DIAGRAM

181 - 190961 - X

79.11.19

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
ATT1	RKS-Z10150-5220	COAXIAL,ATTENUATOR,FIXED 50-OHM 20DB SMA-SMA (1015Z52 20DB)	1	
ATT2 THRU ATT3	MPO-080648-B000	COAXIAL ATTENUATOR (80648B)	2	
ATT4	MKZ-206252-0000	COAXIAL,ATTENUATOR,VARIABLE (5684-10U)	1	
CBL1	182-353271-A010	CABLE ASSY,RF,SOLID JACKETED	1	
CBL2	182-353278-A010	CABLE ASSY,RF,SOLID JACKETED	1	
U1	MPO-090958-A000	SHIFT MIXER (90958A)	1	
Z1	RKS-J10045-1300	CONNECTOR,COAXIAL 50-OHM SMA-SMA (513)	1	

ENG.	ISSUE	90961A	
APPD.		6GHZ SHIFT CCT	
		PARTS LIST	181-290961-X

REV	DESCRIPTION
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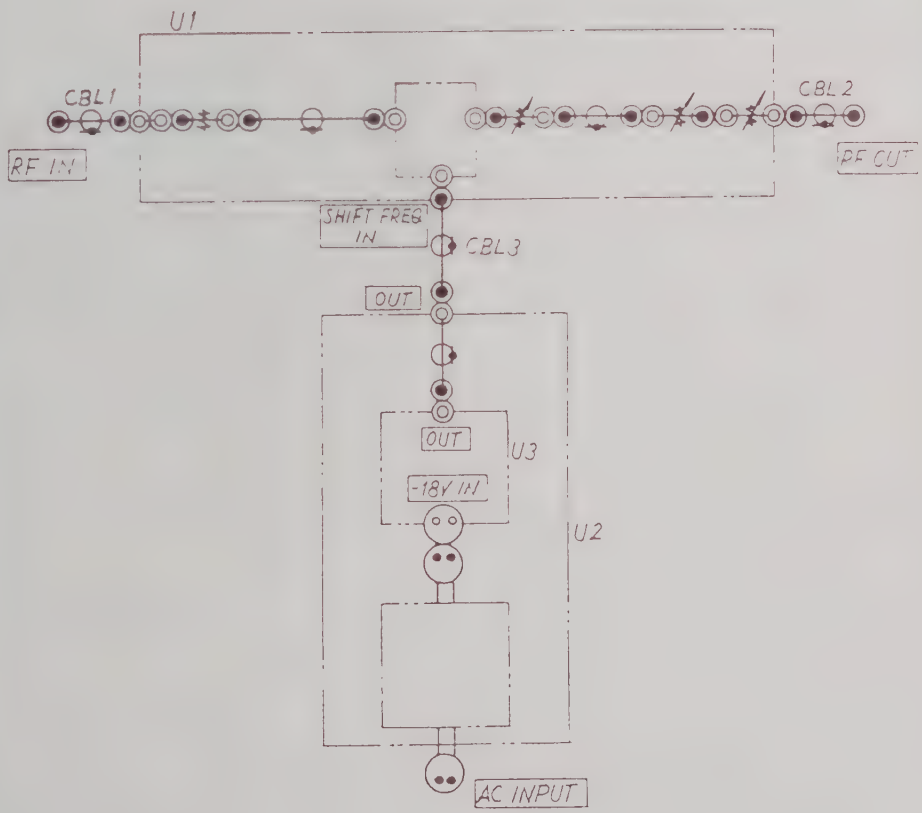

M.O			
FILM			
AP ROLL			
LIMIT	SCALE	/	95336A,B,C,D 7GHz SHIFTER SCHEMATIC DIAGRAM
9009	ENG.	M. Ofuchi	
REF. No.	CHKD.		181-195336-X
	APP.	M. Sakai	

85.06.06

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
CBL1	182-353264-A020	CABLE ASSY	1	
CBL2	182-353264-A020	CABLE ASSY	1	
CBL3	182-353277-A010	CABLE ASSY	1	
U1	MP0-095337-A000	7GHZ SHIFT CCT (95337A)	1	
U2	RKS-E75540-0002	DC POWER SUPPLY (7554E2)	1	95336A AC240V
U2	RKS-E75540-0003	DC PS (7554E3)	1	95336B AC220V
U2	RKS-E75540-0004	DC PS (7554E4)	1	95336C AC230V
U2	RKS-E75540-0001	DC POWER SUPPLY (7554E1)	1	95336D AC115V
U3	RKS-E75550-0001	CRYSTAL OSCILLATOR (7555E1)	1	28-160MHZ
U3	MP0-082063-A000	XTAL OSC (82063A)	1	160-170MHZ
U3	MP0-082064-A000	XTAL OSC (82064A)	1	170-250MHZ
U3	MP0-082061-A000	XTAL OSC (82061A)	1	250-300MHZ
U3	MP0-082065-A000	XTAL OSC (82065A)	1	300-380MHZ

ENG.	ISSUE	95336A,B,C,D
APPD.		7GHZ SHIFTER
		PARTS LIST 181-295336-X

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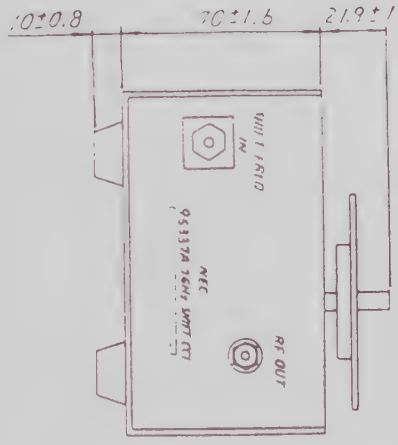

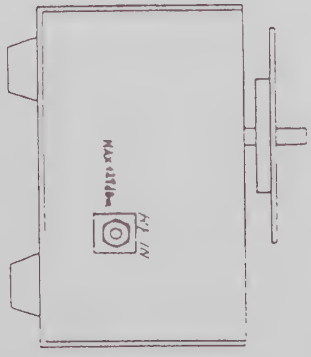

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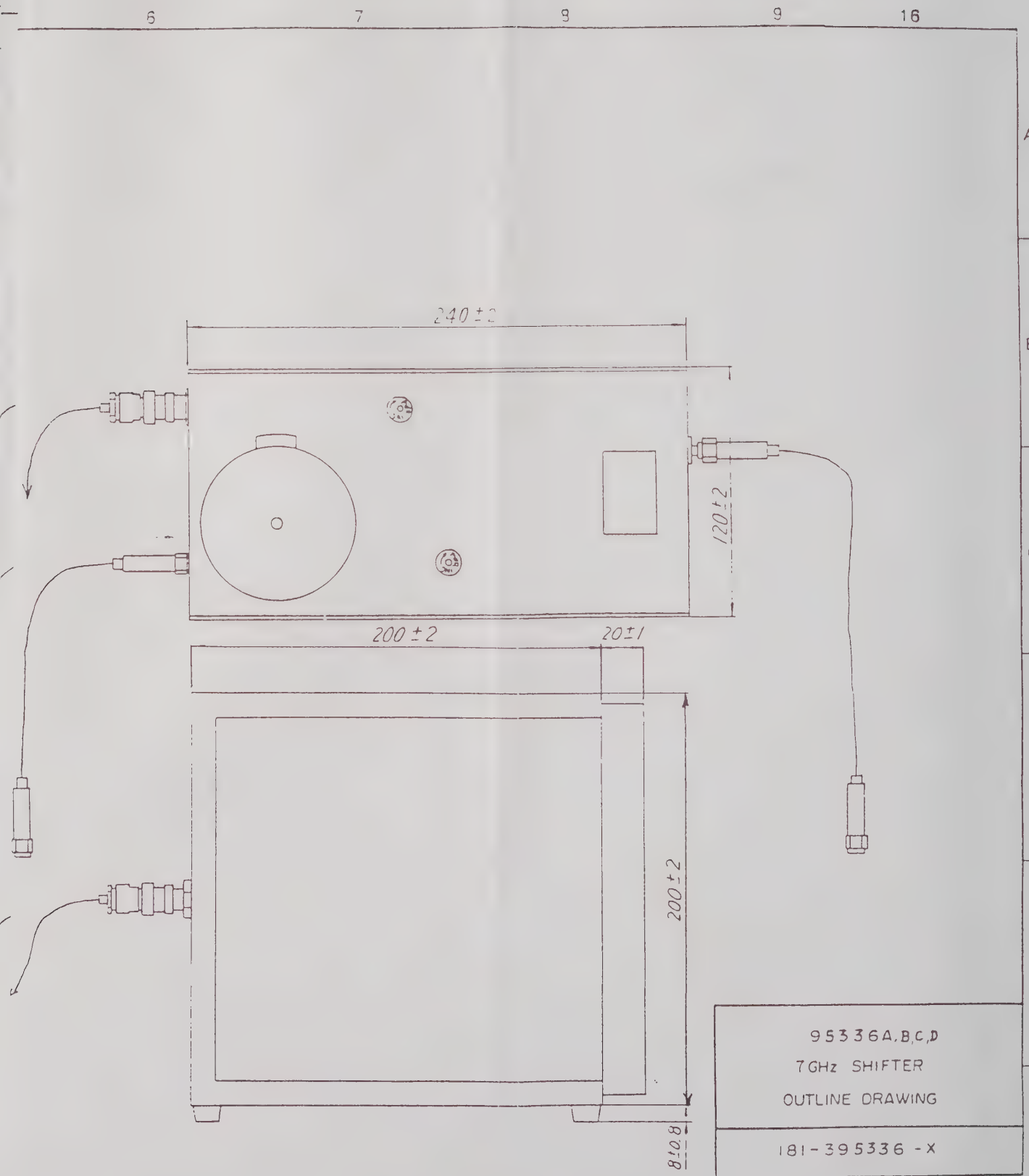
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95336A,B,C,D
7GHz SHIFTER
OUTLINE DRAWING
181-395336 -X

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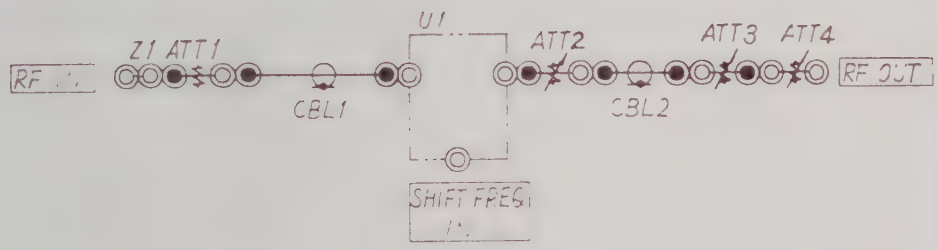

FILM
AP ROLL
LIMIT
9009
REF. No.

SCALE	/
ENG.	M. Ikeuchi
CHKD.	
APP.	M. Sakai

95337A
7GHz SHIFT CCT
SCHEMATIC DIAGRAM

181-195337-X

81.03.03

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
ATT1	RKS-Z10150-5220	COAXIAL,ATTENUATOR,FIXED 50-OHM 20DB SMA-SMA (1015Z52 20DB)	1	
ATT2	MPO-080648-8000	COAXIAL ATTENUATOR (80648B)	1	
ATT3	MPO-080648-8000	COAXIAL ATTENUATOR (80648B)	1	
ATT4	MKZ-208035-0000	ATTENUATOR,VARIABLE (6684-10T)	1	
CBL1	182-353271-A030	CABLE ASSY,RF,SOLID JACKETED	1	
CBL2	182-353741-A050	CABLE ASSY,RF,SOLID JACKETED	1	
U1	MPO-092979-A000	SHIFT MIX (92979A)	1	
Z1	RKS-J10045-1300	CONNECTOR,COAXIAL 50-OHM SMA-SMA (513)	1	

ENG. M. Okubo オクボ マサカ	ISSUE	95337A 7GHZ SHIFT CCT	
APPD.		PARTS LIST	181-295337-X

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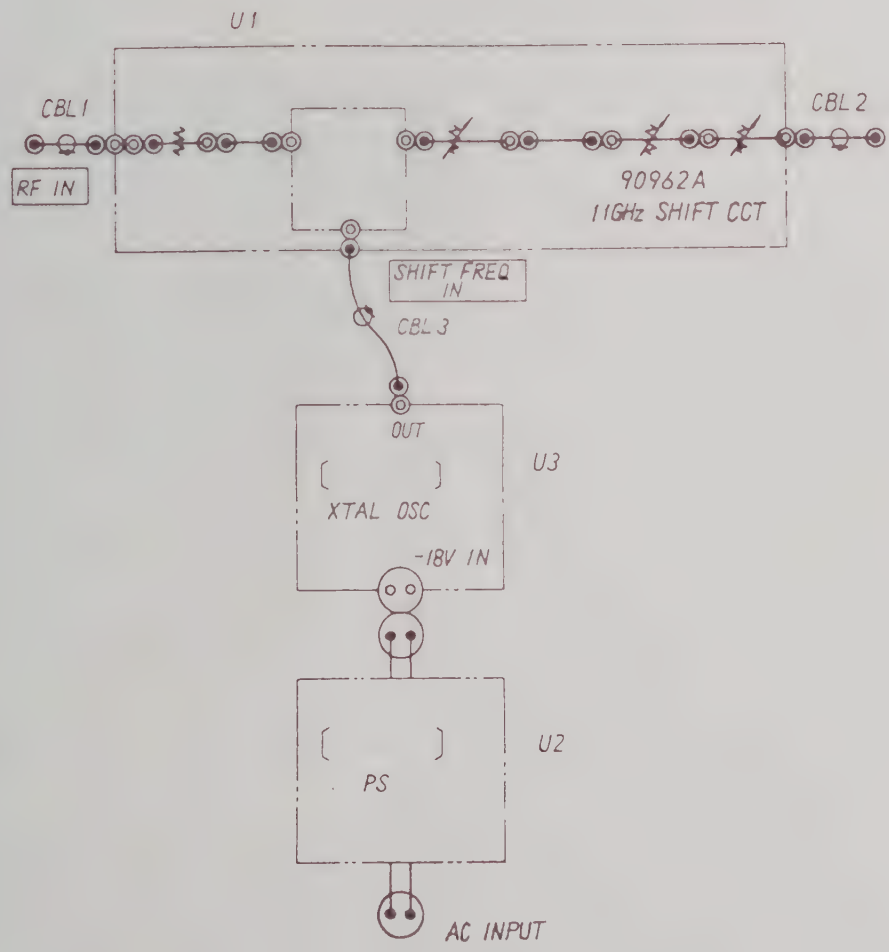

FILM		
AP ROLL		
LIMIT	SCALE	/
	ENG.	H. Kondoh
REF. No.	CHKD.	
	APP.	T. Kyuzaki

90957A
11GHz SHIFTER
SCHEMATIC DIAGRAM

181-190957-X

79.11.15

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
CBL1	182-358264-A020		1	
CBL2	182-358264-A020		1	
CBL3	182-353277-A010	CABLE ASSY	1	
U1	MPO-090962-A000	11GHZ SHIFT CCT (90962A)	1	
U2	RKS-E75540-0001	DC POWER SUPPLY (7554E1)	1	
U3	MPO-082066-A000	XTAL OSC (82066A)	1	390-470MHZ
U3	MPO-082829-A000	XTAL OSC (82829A)	1	490-970MHZ

ENG. H. Konishi	ISSUE	90957A	
APPD.		11GHZ SHIFTER	
		PARTS LIST	181-290957-X

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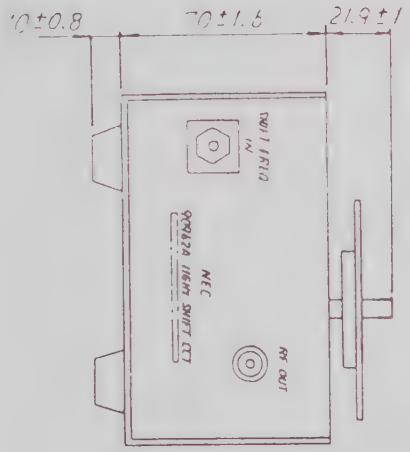

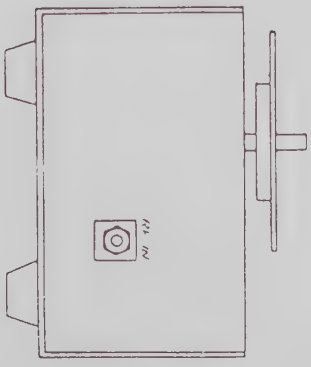

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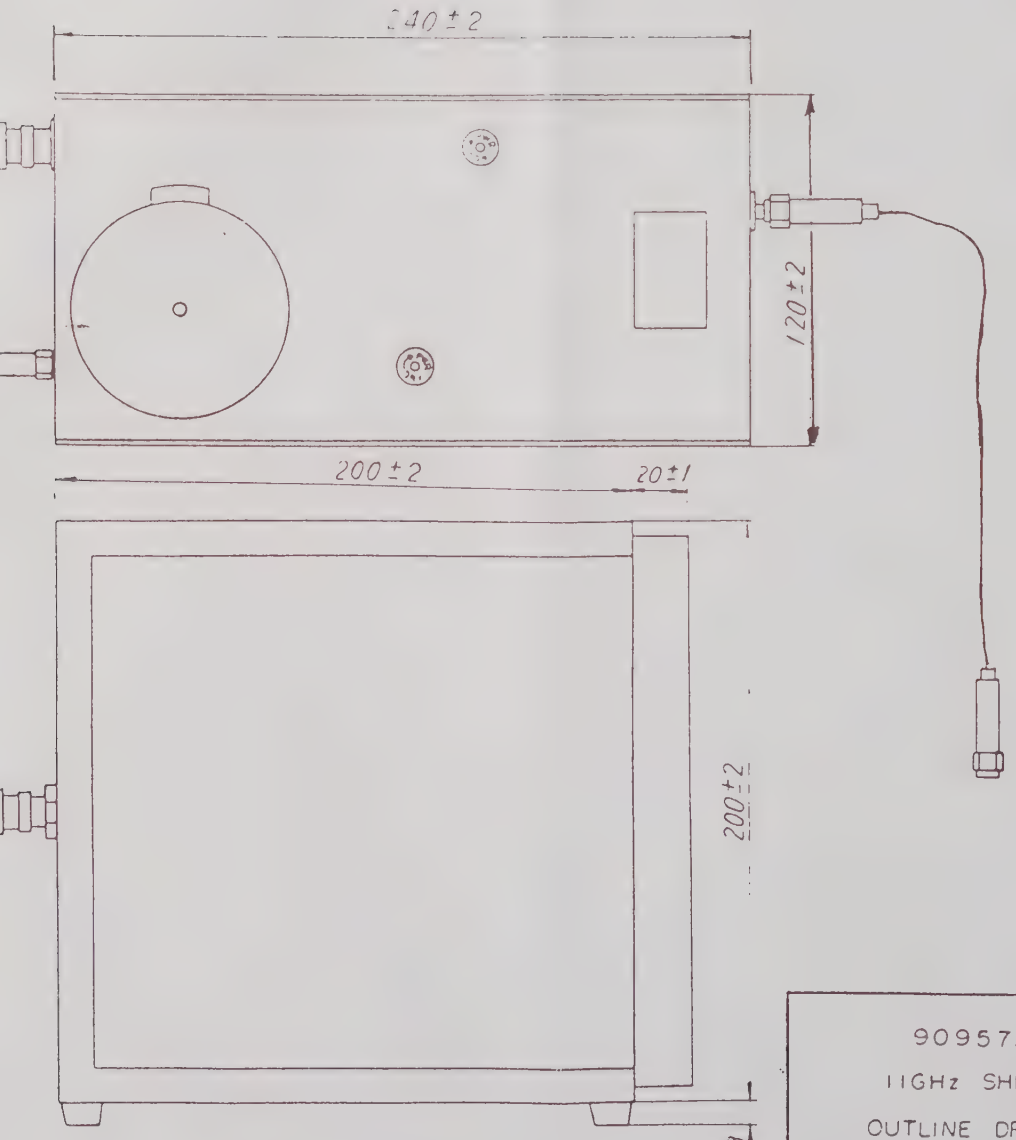
G. T. Haga
KD. H. Loones
PP.

NOTE: All dimensions are in millimeters.



90957A
11GHz SHIFTER
OUTLINE DRAWING

181 - 390957 - X

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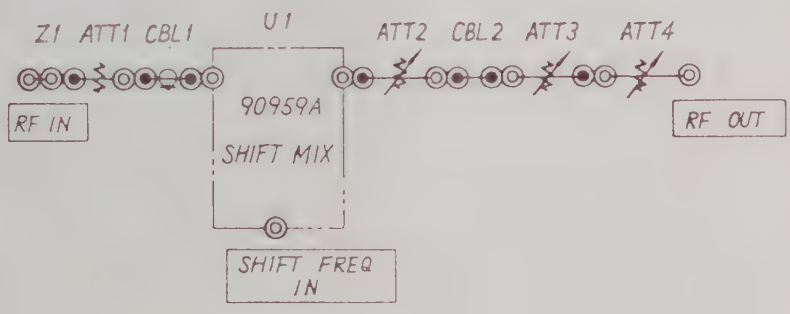

C

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E

FILM			
AP ROLL			
LIMIT	SCALE	/	90962A 11GHz SHIFT CCT SCHEMATIC DIAGRAM
	ENG.	H. Konishi	
REF. No.	CHKD.		
	APP.	T. Kyojaku	181-190962-X

79.11.19

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
ATT1	MKZ-206250-0000	COAXIAL,ATTENUATOR,FIXED (4A916)	1	
ATT2 THRU ATT3	MPO-080648-B000	COAXIAL ATTENUATOR (80648B)	2	
ATT4	MKZ-206251-0000	COAXIAL,ATTENUATOR,VARIABLE (6684-10Q)	1	
CBL1	182-353271-A020	CABLE ASSY,RF,SOLID JACKETED	1	
CBL2	182-353278-A020	CABLE ASSY,RF,SOLID JACKETED	1	
U1	MPO-090959-A000	SHIFT MIXER (90959A)	1	
Z1	RKS-J10045-1300	CONNECTOR,COAXIAL 50-OHM SMA-SMA (513)	1	

ENG. H. Kawabe	ISSUE	90962A 11GHZ SHIFT CCT
APPD. Kazuo Kawabe		PARTS LIST 181-290962-X

NECA-163-90

A9616A SIGNAL GENERATOR

DESCRIPTION, OPERATION, MAINTENANCE, AND REFERENCE DRAWINGS

A9616A SIGNAL GENERATOR
DESCRIPTION, OPERATION, MAINTENANCE AND REFERENCE DRAWINGS

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2. DESCRIPTION WO-I-1
A. General Description WO-I-1
B. Composition WO-I-1
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3. OPERATION WO-I-2
A. Jacks, Controls and Indicators ... WO-I-4
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1. GENERAL

1.01 This section contains the description, operation, maintenance and reference drawings of the A9616A Signal Generator.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

2. DESCRIPTION

2.01 This part provides descriptive information on the A9616A Signal Generator. Included are the general description, composition, performance, and functional operation.

A. General Description

2.02 The A9616A Signal Generator is designed to permit the proper adjustment of the linearizer in transmitter-receiver equipment used in the 16/64 quadrature amplitude modulation (QAM) digital microwave radio (DMR) system. That is, the A9616A Signal Generator provides an IF test signal comprising 66 MHz, 68.2 MHz, 72 MHz and 73.8 MHz carrier waves for measuring nonlinear distortion of the transmitter.

B. Composition

2.03 The A9616A Signal Generator is composed of a B0253A signal generator and a 7554E21 DC power supply circuit fixed on a rack as shown in Fig. 1. The dimension of A9616A Signal Generator is as follows: 208 mm H x 104 mm W x 220 mm D (8.2" x 4.1" x 8.7").

C. Performance

2.04 The performance characteristics of the A9616A Signal Generator are listed in Table A.

D. Functional Operation

2.05 A functional block diagram of the A9616A Signal Generator is shown in Fig. 2. The B0253A signal generator, which is operated by −18 V dc source produced from 115 V ac source at the 7554E21 DC power supply circuit, produces four carrier waves of 66 MHz, 68.2 MHz, 72 MHz and 73.8 MHz to permit the proper measurement of nonlinear distortion caused by the transmitter used in the 16/64 QAM DMR system.

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2.06 Each of four oscillators in the B0253A signal generator produces a carrier wave at specified frequency and feeds it to an associated amplifier. The amplifier amplifies the incoming carrier wave to obtain power at −2 dBm per single carrier wave at the output port. Here, the hybrid 1 combines the amplified 66 MHz and 68.2 MHz carrier waves, and the hybrid 2 mixes the 72 MHz and 73.8 MHz carrier waves. Finally, the hybrid 3 combines the two signals fed from the hybrid 1 and the hybrid 2 to produce a signal comprising 66 MHz, 68.2 MHz, 72 MHz and 73.8 MHz carrier waves. The hybrid 3 output signal is level-coordinated by the AV 1 control to obtain power at +4 dBm. The signal thus obtained is used as a test signal for the nonlinear distortion measuremen

3. OPERATION

3.01 This part provides instructions for operating th A9616A Signal Generator. Included are informatio on the jacks, controls and indicators, and procedures for tes connections.

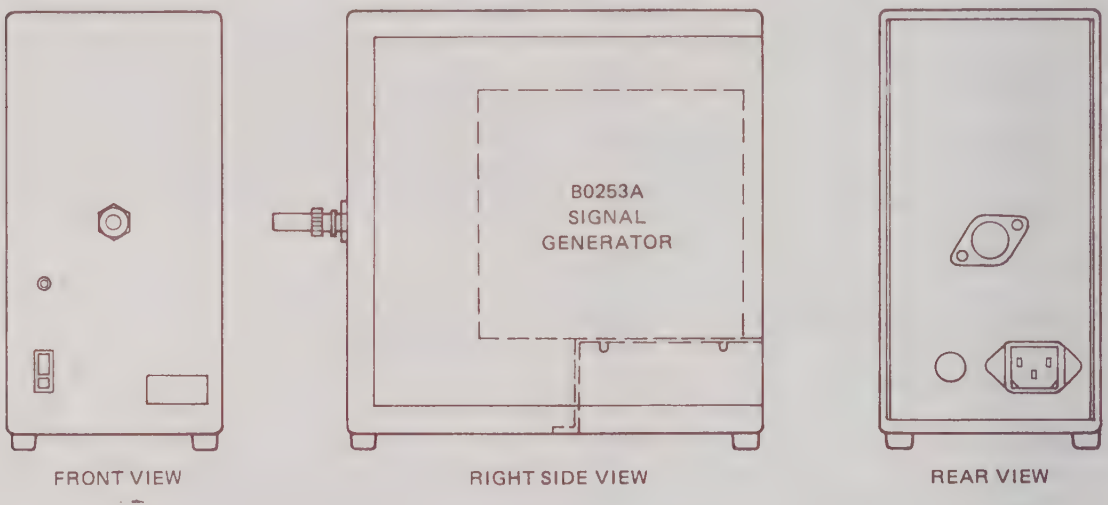


Fig. 1— A9616A Signal Generator

TABLE A

PERFORMANCE

Power requirements:	115 V ac ±10%, approx 15 W
Output characteristics:	
Frequencies:	66.0 MHz ±500 kHz 68.2 MHz ±500 kHz 72.0 MHz ±500 kHz 73.8 MHz ±500 kHz
Level:	+4 dBm at combined signal −2 dBm per single carrier wave
Impedance:	75 ohms, unbalanced
Return loss:	20 dB or more
Third-order intermodulation product:	60 dB or more

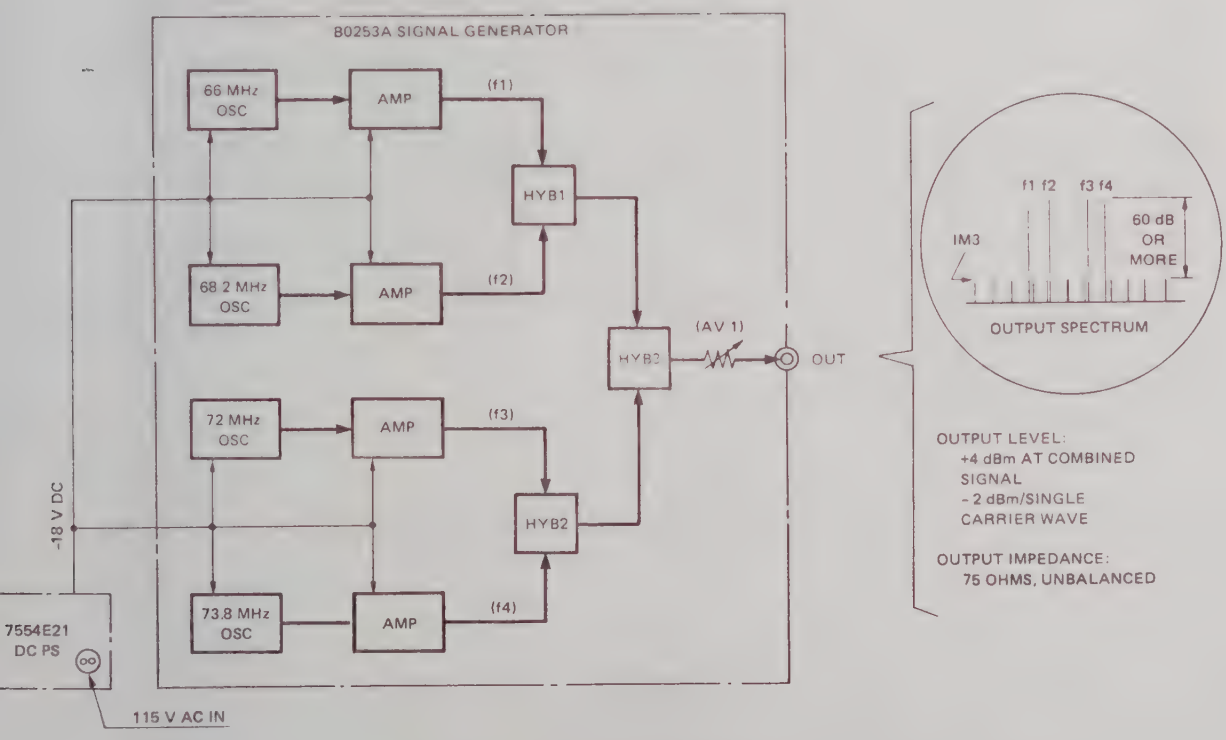


Fig. 2—Functional Block Diagram

A. Jacks, Controls and Indicators

3.02 Information on the jacks, controls and indicators is given in Fig. 3.

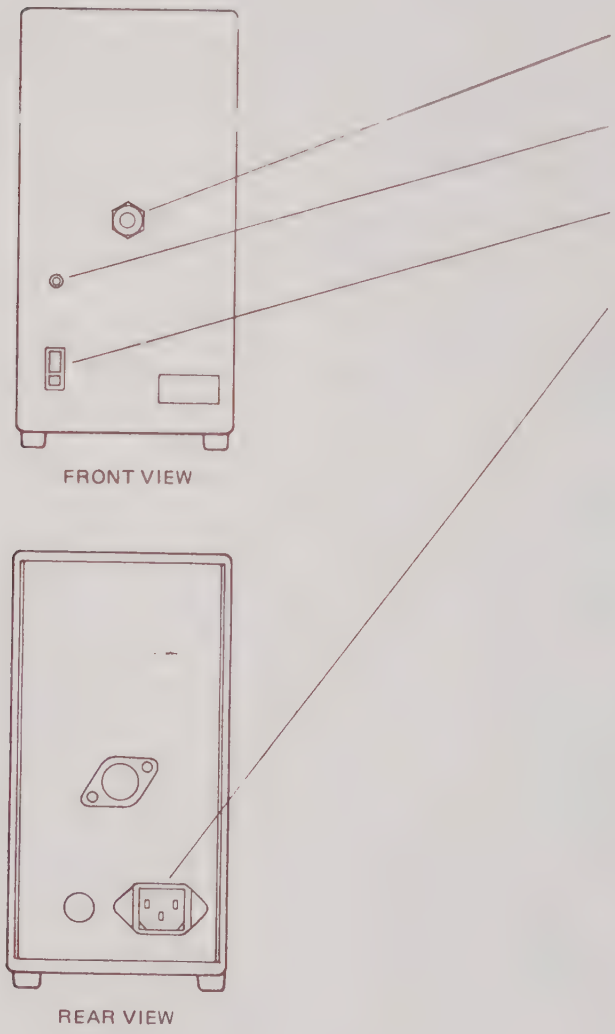

Output jack:
Provides test signal.
LED indicator:
Indicates normal status of -18 V dc power.
Power on/off switch:
Turns 115 V ac input power on or off.
Power input jack:
Inputs 115 V ac power when connected to ac outlet b
attached cord.
FRONT VIEW
REAR VIEW

Fig. 3—Jacks, Controls and Indicators

Test Connections

3 The procedures for connecting the A9616A Signal Generator for the nonlinear distortion mesurement given in Chart 1.

CHART 1

TEST CONNECTIONS

This chart provides only the procedures required to connect the A9616A Signal Generator to the transmitter-receiver equipment for the nonlinear distortion measurement. The nonlinear distortion measurement should be performed according to the procedures (for linearizer adjustment) given in related equipment manuals.

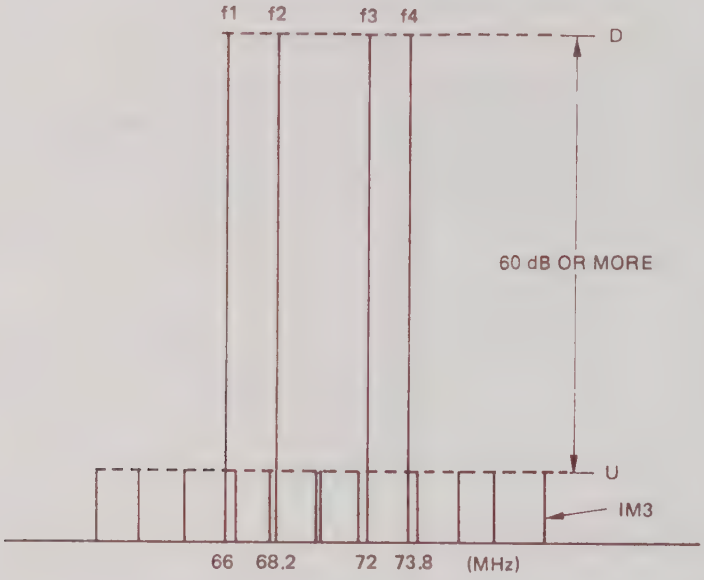
APPARATUS:

Refer to Fig. 4

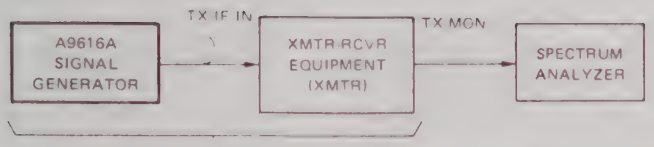
STEP	PROCEDURE
1	Turn on power on/off switch on A9616A Signal Generator
2	Allow at least 15 minutes to warm up
3	Set up as in Fig. 4, CONN 1 and CONN 4 for 64 QAM DMR system or CONN 1 and CONN 5 for 16 QAM DMR system
4	For 64 QAM DMR system, adjust variable attenuator to obtain specified transmitter input power (0 dBm ±0.5 dB). For 16 QAM DMR system, verify +3.5 to +4.5 dBm indication of power meter
5	Disconnect power meter from adapter SJ-BNCJ (6)
6	Set up as in Fig. 4, CONN 2 and CONN 4 for 64 QAM DMR system or CONN 2 and CONN 5 for 16 QAM DMR system

CHART 1 (Cont)

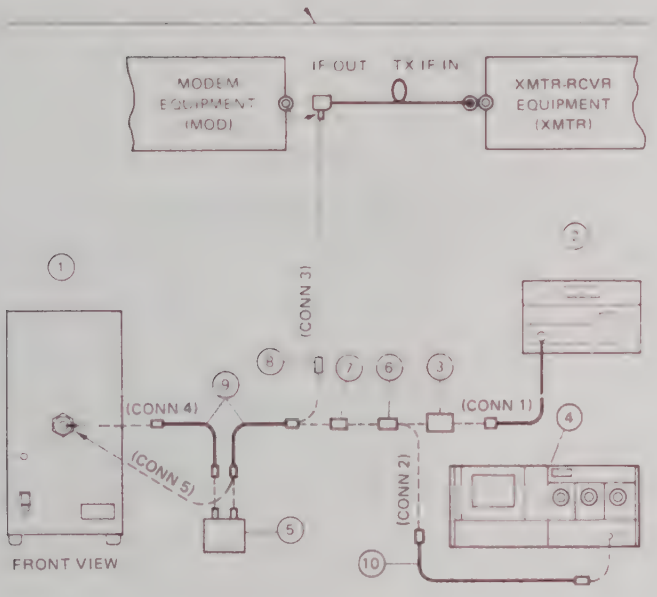
STEP	PROCEDURE
7	Verify that displayed spectrum meets requirements shown below (Verification of A9616A Signal Generator is completed)



8	Disconnect spectrum analyzer from coaxial cable (9) of variable attenuator output
9	Disconnect coaxial cable from IF output jack of related modulator-demodulator equipment
10	Set up as in Fig. 4, CONN 3 and CONN 4 for 64 QAM DMR system or CONN 3 and CONN 5 for 16 QAM DMR system.



(a) Nonlinear Distortion Measurement Test



(b) A9616A Signal Generator Verification and Connection

TEST SETS AND ACCESSORIES USED

NO.	TEST SETS/ACCESSORIES	TYPE/CODE NO.	MFR	REMARKS
(1)	Signal Generator	A9616A	NEC	
(2)	Power Meter	436A	HP	
(3)	Power Sensor	8483A	HP	75Ω
(4)	Spectrum Analyzer	8565A	HP	
(5)	Variable Attenuator	91169D	NEC	
(6)	Adapter SJ-BNCJ	1011J24	NEC	Type S(f) to Type BNC(f)
(7)	Adapter SP-3CJ-3CP	1005Z28	NEC	Type BNC(m) to Type SP(f)
(8)	Adapter SP-3CPA	1005Z5	NEC	Type SP(f) to Type SP(f)
(9)	Cable	142-118269	NEC	Type SP(m) to Type SP(m)
(10)	Cable	182-112002	NEC	Type S(m) to Type S(m)

Fig. 4—Test Connections

4. MAINTENANCE

4.01 This part provides instructions for maintenance of the A9616A Signal Generator. Included are the concept of maintenance and the procedures for fuse check and replacement.

A. Concept of Maintenance

4.02 Generally, the A9616A Signal Generator does not require preventive maintenance and corrective maintenance in the field except fuse check and replacement.

Therefore, when the A9616A Signal Generator is faulty, a fuse should be first checked and replaced with a spare when it is blown (For checking and replacing the fuse, refer to Chart 2). The A9616A Signal Generator which repeatdly blow the fuse and has internal fault should be sent to NEC America Inc for repair.

B. Fuse Check and Replacement

4.03 The procedures for checking and replacing the fuse are given in Chart 2.

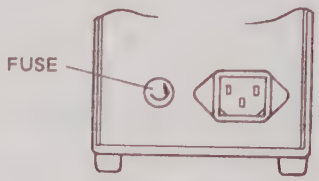
CHART 2

FUSE CHECK AND REPLACEMENT

APPARATUS:

None required

STEP	PROCEDURE
1	Verify that power on/off switch on A9616A Signal Generator is turned off
2	Remove fuse from fuseholder by turning cap counterclockwise (see illustration shown below)
3	Check removed fuse. If fuse is blown, proceed with Step 4. If fuse is not blown, replace removed fuse into fuseholder by turning cap clockwise
4	Place new fuse (1 A) into fuseholder by turning cap clockwise.



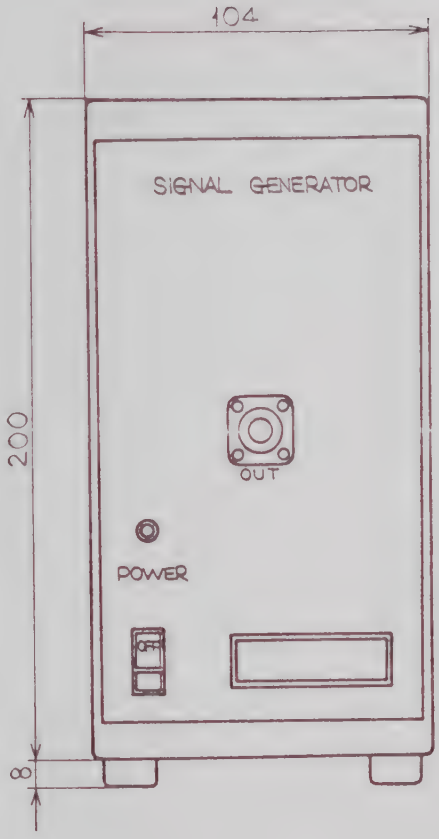
REAR VIEW

REFERENCE DRAWINGS

This part provides reference drawings for the A9616A Signal Generator. The reference drawings are listed w.

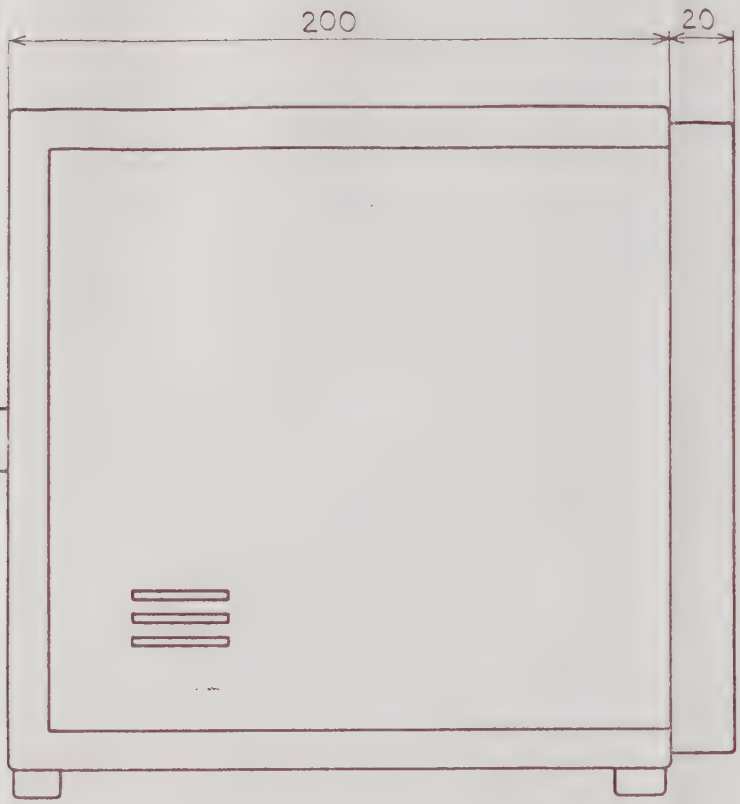
	DRAWING NUMBER
ipment outline drawing:	181-3A9616-X
Equipment parts list and schematic diagram:	181-2A9616-X 181-1A9616-X
B0253A signal generator module parts lists and schematic diagram:	181-2B0253-1/6X to 6X 181-1B0253-X

ISSI	DESCRIPTION
1	



Y.H

FILM		
AP ROLL	SCALE	
LIMIT	ENG.	
	CHKD.	
REF. No.	APP.	U. Shikara
		T. Arai



A9616A
SIGNAL GENERATOR
OUTLINE DRAWING

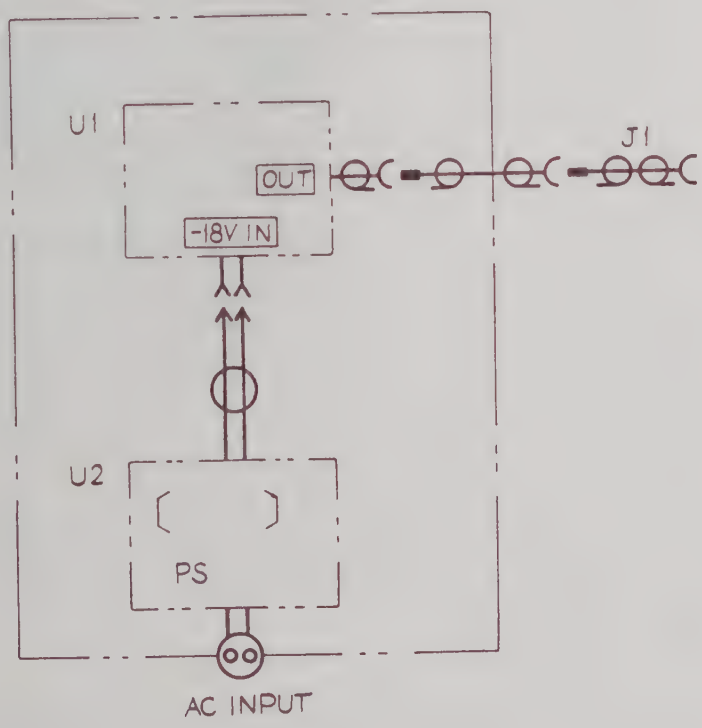
181-3A9616-X

85.10.22

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
J1	RKS-Z10050-2800	CONNECTOR,COAXIAL 75-OHM SP-BNC (SP-3CJ-3CP)	1	
U1	MP0-0B0253-A000	SIGNAL GENERATOR (B0253A)	1	
U2	RKS-E75540-0021	DC PS (7554E21)	1	AC 115V

ENG. イシカワ ヒカル	ISSUE	A9616A SIGNAL GENERATOR	
APPD. T. Arai		PARTS LIST	181-2A9616-X

ISS	DESCRIPTION
1	



A : AC115V
B : AC240V
C : AC220V
D : AC230V
E : AC100V

FILM		
AP ROLL		
LIMIT	SCALE	A9616A~E SIGNAL GENERATOR SCHEMATIC DIAGRAM
	ENG. H. Ishijima	
REF. No.	CHKD.	181-1A9616-X
	APP. T. Arai	

85.10.30

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
		(Pw8)		
AV1	CSC-850070-0002	ATTENUATOR,VARIABLE (NV12DC12CH)	1	
C1	MKR-000039-R00C *	CAPACITOR,FIXED,CERAMIC 9PF +-0.25PF 50V (RD200CH090CX50)	1	5P-10PF
C2	MKR-000038-R00C *	CAPACITOR,FIXED,CERAMIC 8PF +-0.25PF 50V (RD200CH080CX50)	1	5P-10PF
C3	MKR-000037-R00C *	CAPACITOR,FIXED,CERAMIC 7PF +-0.25PF 50V (RD200CH070CX50)	1	5P-10PF
C4	MKR-000036-R00C *	CAPACITOR,FIXED,CERAMIC 6PF +-0.25PF 50V (RD200CH060CX50)	1	5P-10PF
C5	MKR-000031-0R0C *	CAPACITOR,FIXED,CERAMIC 10PF +-0.25PF 50V (RD200CH100CX50)	1	4P-12PF
C6	MKR-000031-0R0C *	CAPACITOR,FIXED,CERAMIC 10PF +-0.25PF 50V (RD200CH100CX50)	1	4P-12PF
C7	MKR-000031-0R0C *	CAPACITOR,FIXED,CERAMIC 10PF +-0.25PF 50V (RD200CH100CX50)	1	4P-12PF
C8	*			OPN
C11 THRU C14	MKZ-207701-0000	CAPACITOR,FIXED,CERAMIC 470000PF +80-20% 50V (CKD15F1H474Z)	4	
C21 THRU C23	MKZ-207701-0000	CAPACITOR,FIXED,CERAMIC 470000PF +80-20% 50V (CKD15F1H474Z)	3	
	*THE OPTIMUM PART IS SELECTED AT FACTORY.			

ENG.	ISSUE	B0253A	
アライ トシアキ		SIGNAL GENERATOR	
APPD.		PARTS LIST	181-2B0253-1/6X

PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
IKW-004020-104Z	CAPACITOR,FIXED,CERAMIC 100000PF +80-20% 50V (CKD10F1H104Z)	1	
MKZ-207701-0000	CAPACITOR,FIXED,CERAMIC 470000PF +80-20% 50V (CKD15F1H474Z)	4	
MKR-000036-R00C *	CAPACITOR,FIXED,CERAMIC 6PF +-0.25PF 50V (RD200CH060CX50)	1	3P-8PF
MKR-000036-R00C *	CAPACITOR,FIXED,CERAMIC 6PF +-0.25PF 50V (RD200CH060CX50)	1	3P-8PF
MKR-000036-R00C *	CAPACITOR,FIXED,CERAMIC 6PF +-0.25PF 50V (RD200CH060CX50)	1	3P-8PF
MKR-000036-R00C *	CAPACITOR,FIXED,CERAMIC 6PF +-0.25PF 50V (RD200CH060CX50)	1	3P-8PF
MKR-000034-R00C *	CAPACITOR,FIXED,CERAMIC 4PF +-0.25PF 50V (RD200CH040CX50)	1	3P-8PF
MKR-000031-0R0C *	CAPACITOR,FIXED,CERAMIC 10PF +-0.25PF 50V (RD200CH100CX50)	1	5P-15PF
MKR-000038-R00C *	CAPACITOR,FIXED,CERAMIC 8PF +-0.25PF 50V (RD200CH080CX50)	1	5P-20PF
MKR-000063-9R0F *	CAPACITOR,FIXED,CERAMIC 39PF 1% 50V (RD204CH390FX50)	1	27P-39PF
MKR-000061-8R0G *	CAPACITOR,FIXED,CERAMIC 18PF 2% 50V (RD204CH180GX50)	1	10P-20PF
MKZ-210972-0000 *	CAPACITOR,FIXED,TANTALUM (221M5002 106M5)	0/1	1/OPN
MKR-072900-107M *	CAPACITOR,FIXED,ELECTROLYTIC 100UF +-20% 50V (3029C1H101EE)	1	1/OPN

*THE OPTIMUM PART IS SELECTED AT FACTORY.

	ISSUE	B0253A SIGNAL GENERATOR	
ｼﾘｱﾙ		PARTS LIST	181-2B0253-2X

85.10.30

SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
HYB1 THRU HYB3	MKZ-203203-0000	TRANSFORMER (T141)	3	
IC1 THRU IC4	MPO-044084-A000	70MHZ OSC (44084A)	4	
IC11 THRU IC14	EMC-5156E0-0000	INTEGRATED CIRCUIT (MC-5156)	4	
IC100	EUP-C16312-HE00	INTEGRATED CIRCUIT (UPC16312H)	1	
L1	RKS-Z22460-0079 *	COIL,FIXED (E040P080ML)	1	6-10T
L2	RKS-Z22460-0079 *	COIL,FIXED (E040P080ML)	1	6-10T
L3	RKS-Z22460-0079 *	COIL,FIXED (E040P080ML)	1	6-10T
L4	RKS-Z22460-0079 *	COIL,FIXED (E040P080ML)	1	6-10T
L41	RKS-Z22460-00E5	COIL,FIXED (E020P150ML)	1	
L42	RKS-Z22460-00E5	COIL,FIXED (E020P150ML)	1	
L43	RKS-Z22460-00E5	COIL,FIXED (E020P150ML)	1	
L44	RKS-Z22460-00E5	COIL,FIXED (E020P150ML)	1	
	*THE OPTIMUM PART IS SELECTED AT FACTORY.			

ENG. アライ トシアキ	ISSUE	B0253A SIGNAL GENERATOR	
APPD.		PARTS LIST	181-2B0253-3X

PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
CS-Z22460-0064	COIL,FIXED (E040P070ML)	1	6-8T
CS-Z22460-0065	COIL,FIXED (E040P060ML)	1	5-7T
CS-Z23900-0101	COIL,FIXED (2390Z001)	4	
CKR-508913-160F	RESISTOR,FIXED,METAL 316-OHM 1% 1/4W (RN14K2E3160F)	4	
CKR-508911-960F	RESISTOR,FIXED,METAL 196-OHM 1% 1/4W (RN14K2E1960F)	1	150-250
CKR-508911-960F	RESISTOR,FIXED,METAL 196-OHM 1% 1/4W (RN14K2E1960F)	1	150-250
CKR-509041-960F	RESISTOR,FIXED,METAL 196-OHM 1% 1/8W (RN26K2B1960F)	1	150-250
CKR-509045-6R2F	RESISTOR,FIXED,METAL 56.2-OHM 1% 1/8W (RN26K2B56R2F)	1	
CKR-509042-150F	RESISTOR,FIXED,METAL 215-OHM 1% 1/8W (RN26K2B2150F)	2	
CKR-509045-6R2F	RESISTOR,FIXED,METAL 56.2-OHM 1% 1/8W (RN26K2B56R2F)	1	
CKR-509042-150F	RESISTOR,FIXED,METAL 215-OHM 1% 1/8W (RN26K2B2150F)	2	
CKR-509045-6R2F	RESISTOR,FIXED,METAL 56.2-OHM 1% 1/8W (RN26K2B56R2F)	1	
CKR-509042-150F	RESISTOR,FIXED,METAL 215-OHM 1% 1/8W (RN26K2B2150F)	2	

*THE OPTIMUM PART IS SELECTED AT FACTORY.

	ISSUE	80253A SIGNAL GENERATOR	
*		PARTS LIST	181-280253-4X

85.10.30

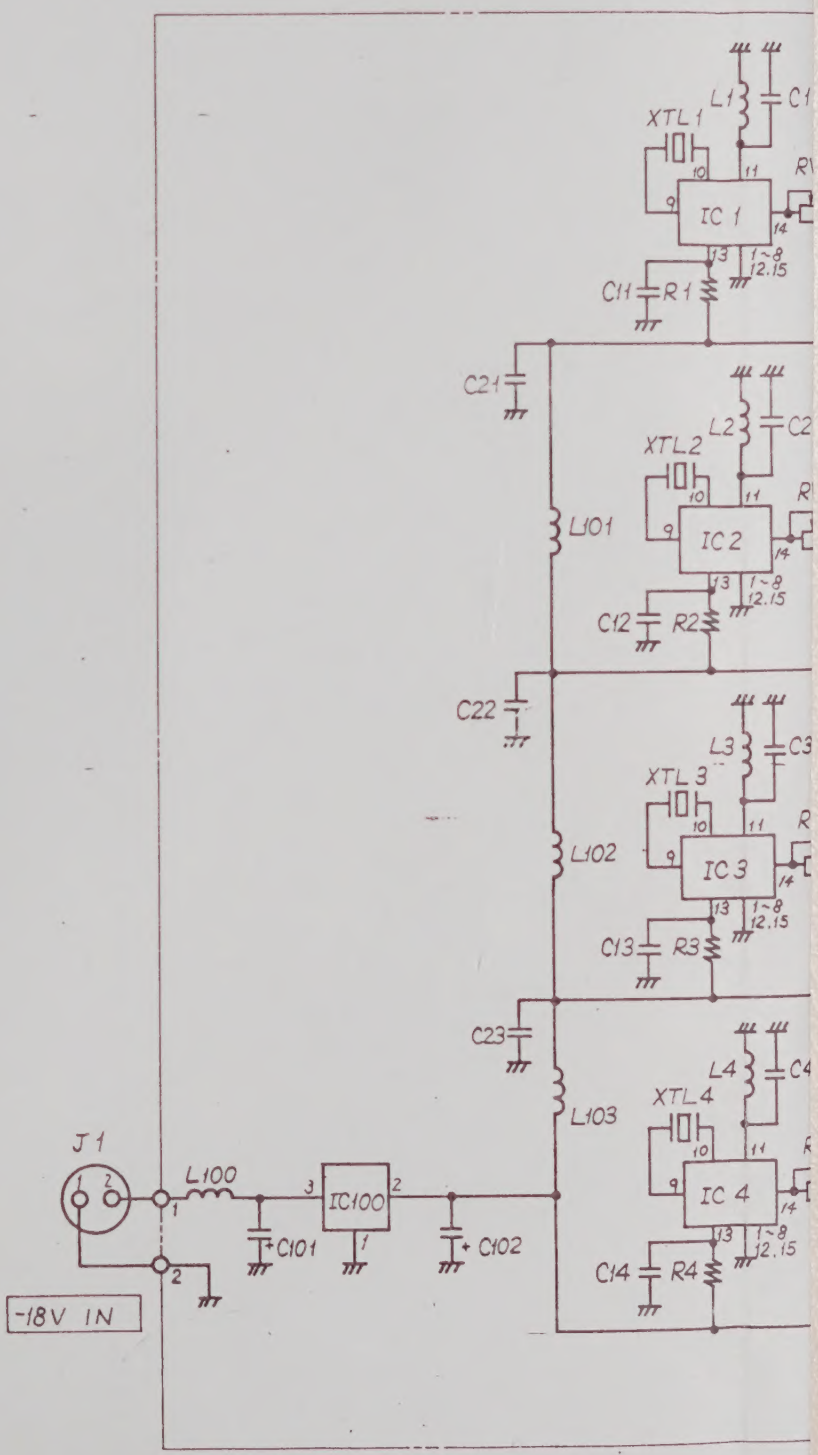
SYMBOL	PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
R41	MKR-509045-6R2F	RESISTOR,FIXED,METAL 56.2-OHM 1% 1/8W (RN26K2B56R2F)	1	
R42 THRU R43	MKR-509042-150F	RESISTOR,FIXED,METAL 215-OHM 1% 1/8W (RN26K2B215OF)	2	
RV1 THRU RV4	MKC-500080-1020	RESISTOR,VARIABLE,METAL 1K OHM 20% 1/2W (MF06PB102H)	4	
XTL1	RKS-Q10270-0067	CRYSTAL UNIT,QUARTZ 66.00000MHZ (1027Q 66.00000MHZ)	1	
XTL2	RKS-Q10270-0068	CRYSTAL UNIT,QUARTZ 68.20000MHZ (1027Q 68.20000MHZ)	1	
XTL3	RKS-Q10270-0069	CRYSTAL UNIT,QUARTZ 72.00000MHZ (1027Q 72.00000MHZ)	1	
XTL4	RKS-Q10270-0070	CRYSTAL UNIT,QUARTZ 73.80000MHZ (1027Q 73.80000MHZ)	1	
	EG2-1E0000-0000	BUSHING (G-21)	1	FOR IC 100
		(OTHERS)		
J1	RKS-J20260-0101	CONNECTOR,RECEPTACLE,COAXIAL 2PIN (RM12BRB-2S)	1	

ENG.	ISSUE	B0253A
アライ トシアキ		SIGNAL GENERATOR
APPD.		PARTS LIST 181-2B0253-5X

PART NUMBER	DESCRIPTION (PART NAME)	Q'TY	NOTE
KS-J10170-0500	CONNECTOR,RECEPTACLE,COAXIAL 50-OHM BNC (3C-R)	1	

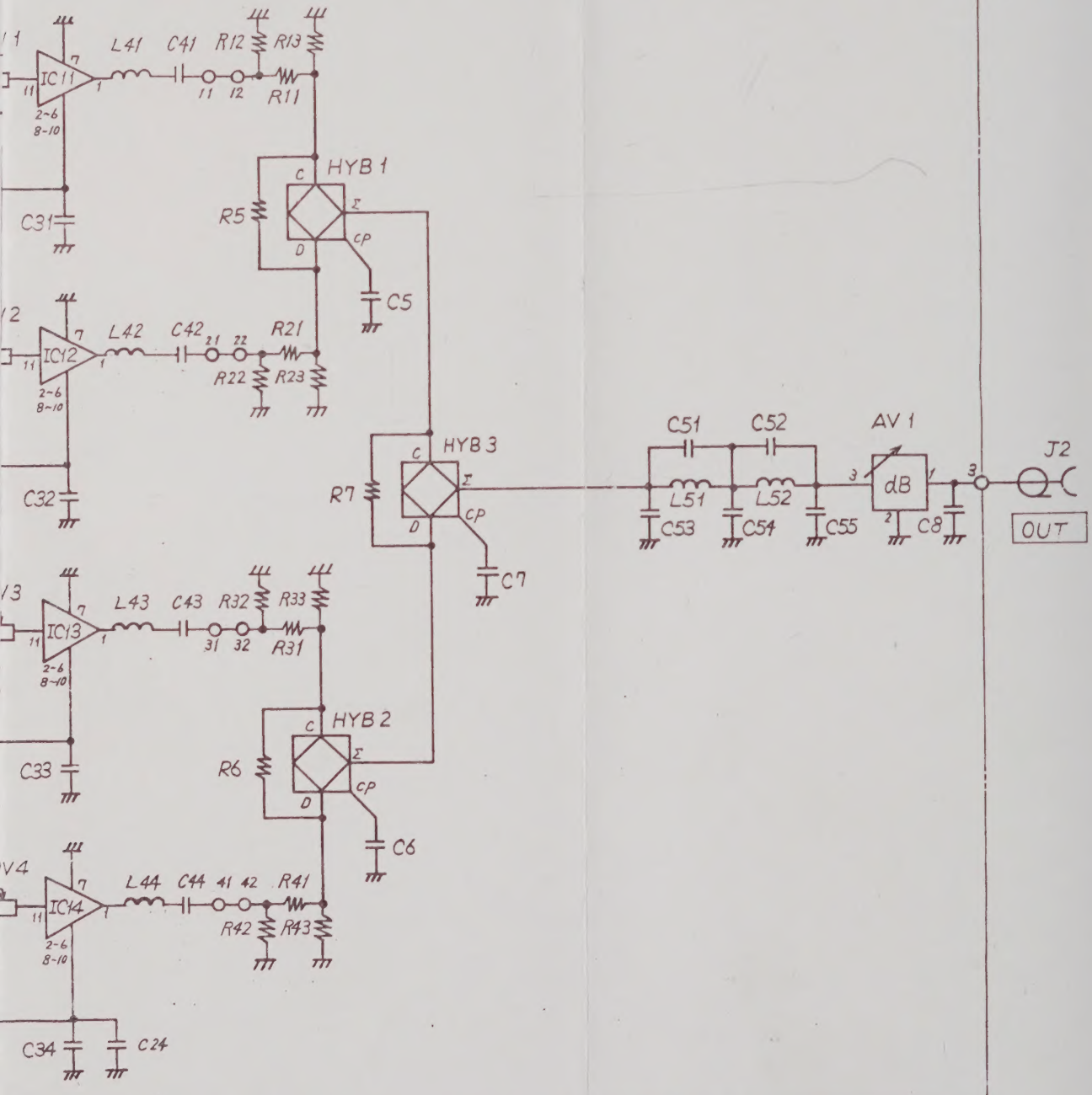
	ISSUE	B0253A	
?#		SIGNAL GENERATOR	
		PARTS LIST	181-280253-6X

ISS	DESCRIPTION
1	



FILM	
AP ROLL	
LIMIT	
REF. No.	

SCALE	/
ENG.	T. Arai
CHKD.	
APP.	N. Takahashi



B0253A
SIGNAL GENERATOR
SCHEMATIC DIAGRAM

181-1B0253-X

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ESSELTE
58804
MADE IN U.S.A.
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